PERDAMAN INDUSTRIES

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Surface Water Management Plan

Perdaman Urea Project

Burrup Peninsula, Western Australia

PCF-PD

Proponent:
Perdaman Chemicals and Fertilisers Pty Ltd.ABN: 31 121 263 741

Date: 09 May 2022

Ministerial Statement No: 1180
Assessment No:
2184 (WA)
2018/8383 (Commonwealth)

PERDAMAN INDUSTRIES

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PCF 4	24/07/2023	Annual review July 2023. Minor amendments and addressing typos. New information regarding Part V Category 12 approval and disturbance of acid sulfate soils has been added.	SCJV	Perdaman

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The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Perdaman is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the site conditions, the site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person

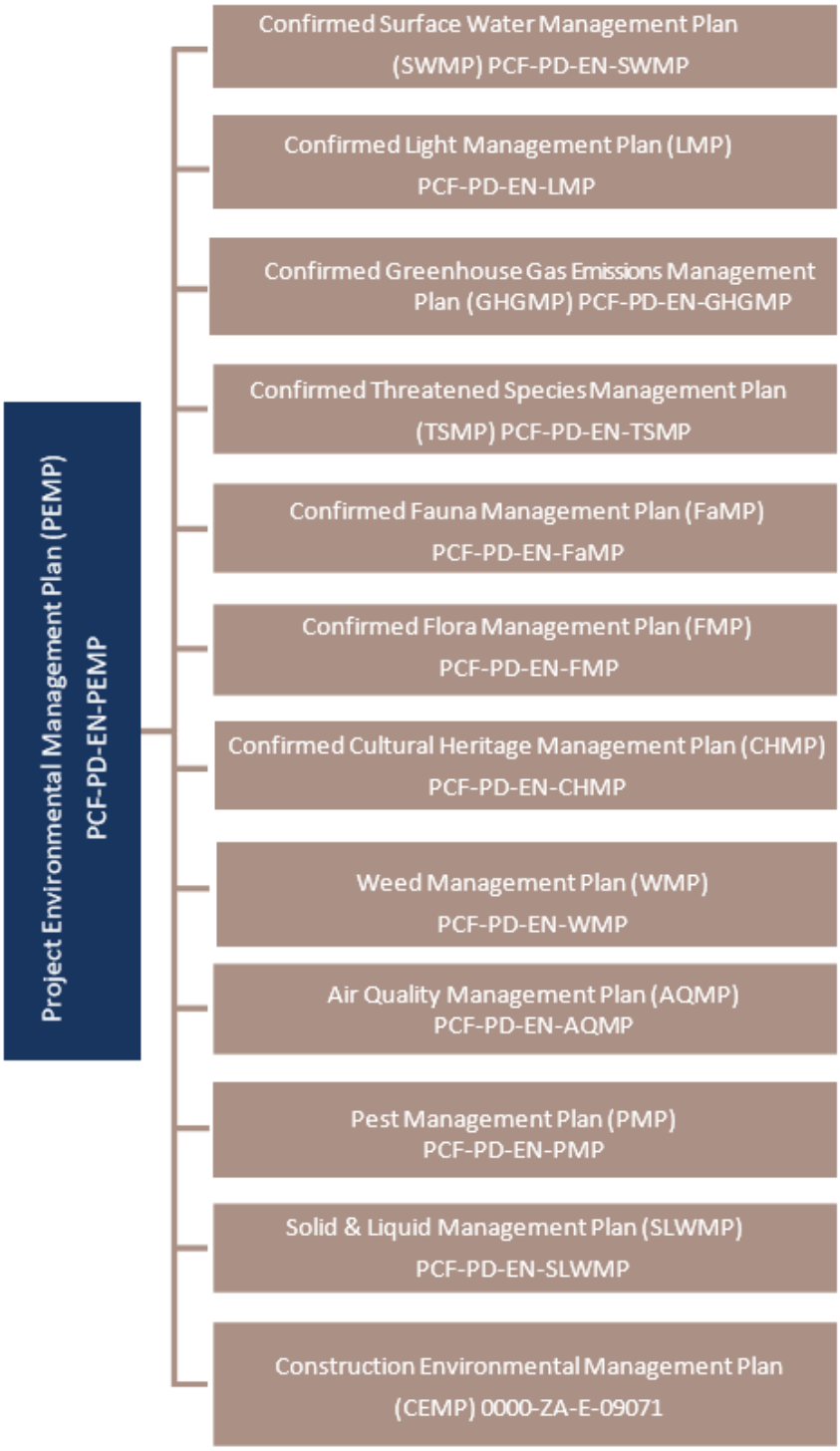
Executive Summary

Project Title	Project CERES
Proponent name	Perdaman Chemicals and Fertilisers Pty Ltd.
Assessment No.	2184 (WA) & 2018/8383 (Commonwealth)
Ministerial Statement No.	1180
Construction & Operations Commencement Dates.	Bulk earthworks is scheduled to commence September 2023. Construction is scheduled to commence June 2024. Operation of the facility is proposed to commence 2027.
Purpose of the SWMP	This Surface Water Management Plan (SWMP) has been prepared to comply with the Conditions for the Project implementation set out in the Ministerial Statement (MS 1180). Condition 8 and Condition 6-1 of MS 1180 includes the implementation Conditions and procedures for surface water and groundwater that are addressed within the SWMP. This SWMP addresses the requirements of Part V Division 3 of the *Environmental Protection act 1986* works approval W6630/2021/1. The SWMP provides a framework which describes how the Project will address, manage, monitor and mitigate impacts to surface water and receiving waterways during construction, operation and decommissioning phases of the Project in accordance with the applicable regulatory requirements, permit obligations and industry best practice as outlined in Section 1 of this document. This SWMP provides monitoring actions for surface water to demonstrate compliance with the environmental outcomes included in Condition 8-1 and Condition 6-1 of MS 1180.
Key environmental factors and objectives	The environmental objective for surface water is associated with the EPA's objective for the factor Hydrological Processes: **To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.**
Condition Clauses	Condition requirements related to MS 1180 for the management of Surface Water have been detailed in Section 1.3 of this Plan. **Condition environmental Objective 6-1:** minimise project attributable impacts on groundwater quality, flow direction and/or depth to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected. **Condition environmental Objective 8-1:** maintain the hydrological regimes and quality of surface water so that environmental values are protected.
Key provisions in the Plan	The SWMP's key provisions are included in Section 2 – Surface Water Management Plan Provisions. This Section details the outcome and management-based actions, that will be applied for the life of the Project.

Foreword

This Surface Water Management Plan (SWMP) is a sub-plan of the overarching Project Environmental Management Plan (PEMP) for Project CERES. An overview of the structure of the PEMP and associated management plans is illustrated in Figure 0-1-1, with the position of the SWMP highlighted within the overall structure.

This Plan shall be reviewed and updated as necessary throughout the construction, operation and decommissioning phases of the project. The review process is detailed in Section 15 of the PEMP: *Review and Continual Improvement*.



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1 Context, Scope & Rationale

1.1 Proposal Description

Perdaman plans to construct and operate a state-of-the-art urea plant with a production capacity of approximately 2 million tonnes per annum (Mtpa) on the Burrup Peninsula in the Northwest of Australia Figure 1-2 (the Project).

The Project infrastructure including the main production facility (urea plant), administration, maintenance and storage infrastructure, conveyor and port storage and shiploading facilities are situated within the Burrup Strategic Industrial Area (Burrup SIA) approximately 8 km from Dampier and 20km north-west of Karratha on the Burrup Peninsula. The Burrup SIA has established industrial facilities including Yara Pilbara Fertilisers and Nitrates plants and Woodside's Pluto LNG plant. The estate's proximity to gas, port and other key infrastructure makes it an ideal location for the Project.

The Burrup SIA is located in close proximity to the Murujuga National Park which covers an area of 4,913ha on the Burrup Peninsula. The area is considered to host the largest concentration of ancient rock art in the world. As such, the Project will apply effective management strategies that minimise or abate, actual or potential impacts on the environment, heritage and cultural values of the region.

The Project involves piping natural gas from the nearby Woodside operated LNG facility to the Project site under a long term commercial off-take agreement. Natural gas is converted to urea and the final granulated product is transported by conveyor to the Dampier Port by closed conveyor along the East West Service route, where new facilities will include an enclosed stockpile shed and ship loading facilities.

Proven Urea production technology underpins each of the key stages of this Project. The technologies being applied to the plant are equivalent to the industry best for the specific applications and successfully operate elsewhere in the world. The processing plant can be broadly considered in four sections, or Blocks, namely:

- Gas Block
- Product Block
- Utility Block
- Infrastructure and Logistics

Each of the Process Blocks is made up of process units or physical sections of the plant. Themajor process sections are described in Figure 1-1 below.

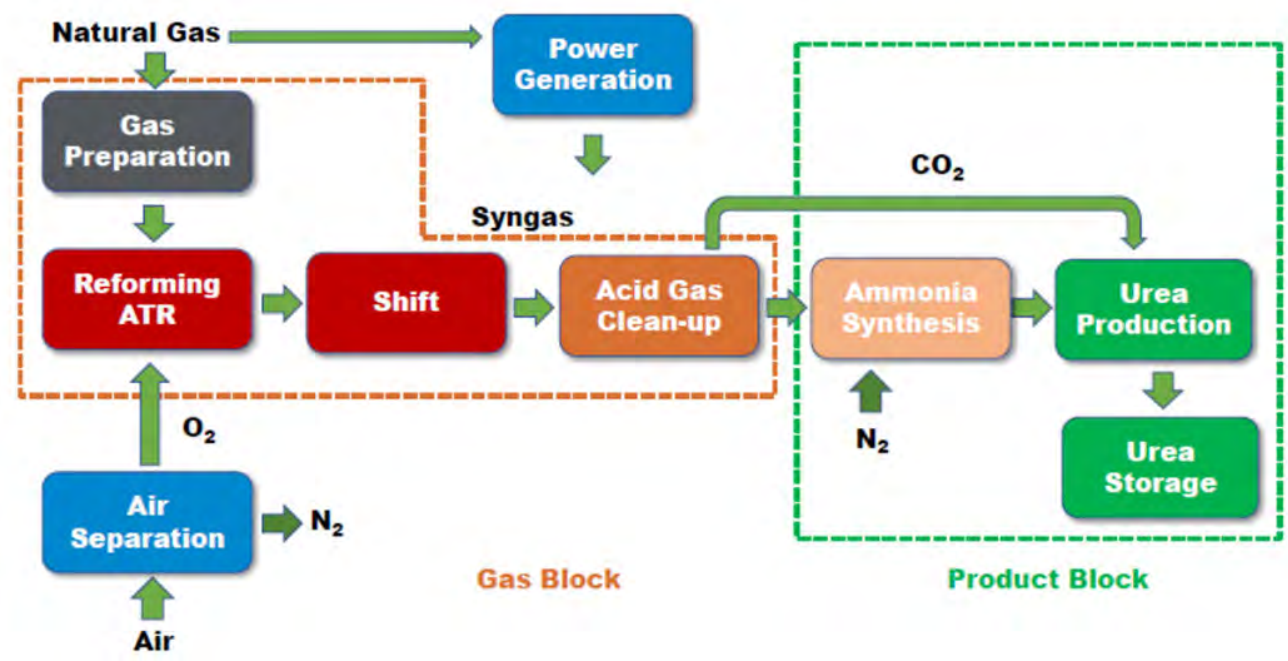

Figure 1-1 Process Block Diagram

Site C

Site C is relatively undeveloped with the exception of a few access roads. The site is situated adjacent to the Yara Ammonia Plant to its east, to the north are steep rocky outcrops and to the south the supra-tidal flat area. Surface water from the site flows in a southerly direction towards the supra-tidal flat between Hearson Cove and King Bay.

Once developed Site C will include the main process plant and a 75,000-tonne urea storage shed.

Site F

Site F is situated to the south of Site C, on the opposite side of the supra-tidal flat area. It includes Hearson Cove Road and a significant proportion of previously disturbed area (now rehabilitated). Surface water from this area flows primarily north into the supra-tidal flat.

This area will be used as laydown for equipment and modules, and for shutdown/ maintenance activities. The east portion of Site F will include the Project's administration, maintenance, storage and warehousing facilities.

Causeway

The causeway, which links Sites C and F, extends across the supra-tidal flat area.

The causeway will be built up above the supra-tidal flat area to a road height of approximately 6m AHD with regular culverts to ensure the structure does not impede natural surface water or tidal flows.

Conveyor

The 3.2km conveyor will transport urea from the storage shed at Site C to the Port loading shed.

From Site C the conveyor will be constructed on relatively undisturbed land, to the west of the existing Water Corp pipeline corridor. It will extend north, connecting to the existing Burrup East West Services Corridor (EWSC).

The EWSC is a bitumen sealed corridor which already includes the Yara Pilbara Fertiliser's ammonia pipeline which extends to the Dampier Bulk Liquids Berth (DBLB) adjacent to the Project's Port facilities. The Project's conveyor will be positioned within this corridor and where possible use existing culverts to avoid roads and other infrastructure. Where the conveyor crosses Woodside's Haul Road the road will be built up to allow the conveyor to pass under.

Surface water in the EWSC will be managed via existing surface water systems for the EWSC infrastructure.

Port Area

The Port Area includes a 75,000-tonne storage shed, covered conveyor and ship loader. The storage shed will be located within an existing quarry and the shiploader on a wharf which will be constructed by Pilbara Port Authority (PPA). The Conveyor will be situated on cleared area associated with the new wharf and quarry, and a small section of rocky ground between these two areas.

To maintain product integrity, it is imperative that urea is kept dry throughout the storage, transfer and loading process. As such, urea will remain isolated from rainfall and stormwater which will be managed through existing surface water channels.

1.1.1 Scope and Requirement for the Plan

In accordance with condition 8-2 (MS 1180) the Surface Water Management Plan (PCF-PD-EN-SWMP-PCF3) was provided to the **CEO** on 9 May 2022 as a revised version of the *Surface Water Management Plan, Perdaman Urea Project Burrup Peninsula, Western Australia (Version PCF 1, 24 January 2021)* which has been prepared in consultation with the Murujuga Aboriginal Corporation and meets the requirements of condition 8-2. The CEO confirmed in writing on 13 July 2022 that the Surface Water Management Plan submitted (PCF-PD-EN-SWMP-PCF3) satisfies the requirements of Condition 8-2.

This Confirmed Surface Water Management Plan (SWMP) applies to all Project sites during the construction, operation and decommissioning phases. This includes, but is not limited to, works at Site C, Site F, the causeway, the conveyor corridor, Port side storage, product transfer and ship loading areas. A short description of these areas is provided in Section 1.1 above.

In accordance with Section 3.1 this plan has undergone an annual review.

This SWMP has been prepared to meet the requirements of the EPA's "*Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plan*" (2021). In accordance with ministerial condition (MS 1180) 8-2 this Plan shall demonstrate it has met the requirements detailed within conditions 8-2 (1) through to 8-2 (7).

This document will be periodically updated as new approvals are received and compliance requirements are determined. This document will be updated following construction to apply updated operational aspects of the Project.

Specifically, the SWMP applies to:

- Design considerations for controls based on rainfall statistics and site conditions including geology, gradient and ground cover;

- All ground disturbing activities associated with site establishment;
- All earthworks and cut and fill activities including batter formation and stabilisation;
- All surface water systems including cut-off drains, table drains, swale drains and sediment basins;
- Establishment and use of internal access tracks;
- Establishment and operation of site facilities including administration, maintenance, servicing and laydown;
- Establishment and operation of temporary concrete batching plants;
- All sediment control measures including silt fences, rock checks, baffles and sediment basins;
- Stockpiles and soil management;
- All erosion control measures;
- All pollution control measures;
- All stormwater and wastewater management measures;
- Culverts at the causeway;
- Outlet discharge structures; and
- Site rehabilitation activities.

The scope of this SWMP does not include the construction of port facilities such as the jetty or infill of the coastal area for the provision of a wharf. These Works are to be managed by the Pilbara Port Authority (PPA) and are subject to separate approvals. The area in which the conveyor, shiploader and storage shed will be constructed is a highly disturbed area.

This document applies to all phases of the Project including but not limited to, Planning, Design, Construction, Commissioning and Operations.

This document will be periodically updated as new approvals are received and compliance requirements are determined. This document will be updated following construction to apply to updated operational aspects of the Project.

This Surface Water Management Plan (SWMP) provides the environmental management requirements for the diversion, collection, conveyance, treatment, recycling and discharge of surface water. It includes a series of specific management strategies that will be applied across the construction, operation and decommissioning phases of the Project to avoid and mitigate impacts.

The main potential surface water impacts on the Project include surface water management within the Project footprint, diversion of surface water run-off around the site and the disposal of effluent and process waters from the production, transport and storage facilities. The primary strategies that will be implemented to address these impacts include treatment systems, surface water storage and discharge infrastructure. Where practicable, treated process water and effluent, and the site's clean stormwater will be reused within the process plant. Contaminated water which cannot be treated to a satisfactory standard will be removed off site and disposed of at a suitable waste facility.

A suite of performance criteria and related response actions, management strategies and monitoring programs will be implemented throughout the construction and operational phases of the Project to minimise or abate these impacts. These in conjunction with the conditions in MS 1180 are the provisions with which this SWMP has been written to comply and that will be adhered to across all Project sites under the control of Perdaman.

1.1.2 Responsibility

The responsibility for surface water management sits primarily with Perdaman, which will ensure appropriate inductions, training and communication of this Plan is provided to all Project Personnel.

It is the responsibility of all Project Personnel to understand their scope of works and how surface water management applies to their activities.

It is the responsibility of the OWNER to ensure that this Confirmed Surface Water Management Plan satisfies the requirements of condition 8-2 of MS 1180 at least 6 months prior to ground disturbing activities, which cannot commence until the CEO (of the EPA) confirms in writing this Plan satisfies these requirements (condition 8-2).

The OWNER shall implement the most recent version of the Confirmed Surface Water Management Plan until the CEO (of the EPA) has confirmed by notice in writing that the OWNER has demonstrated that the objective detailed in Condition 8-1 of MS 1180 has been met.

Section 1.3 of this Plan outlines requirements for the implementation of the Project as provided by the Minister for the Environment in the Ministerial Statement (1180).

1.1.3 Legislative Framework

Perdaman has sought approvals for Project CERES under both State and Commonwealth legislative frameworks. The two main legislative Acts that relate to this Project and provide the overall framework for environmental management for the Project are as follows:

- *Environment Protection and Biodiversity Conservation Act, 1999 - Commonwealth*
- *Environmental Protection Act 1986 - State*

Project CERES was referred to the Environmental Protection Authority (EPA) under the Environmental Protection Act 1986 in accordance with Section 38 Part IV. Pursuant to section 45 of the EP Act, it has been agreed that Project CERES may be implemented under the Conditions of Ministerial Statement 1180, as of the 24th of January 2022.

The Australian Government's key environmental legislation is the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EPBC Act protects and manages matters of national environmental significance (MNES) which include nationally and internationally important flora, fauna, ecological communities, and heritage places.

The EP Act provides for "**the prevention, control and abatement of pollution and environmental harm**, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing".

The Project was also referred to the Commonwealth Department of Environment and Energy (DoEE) under the EPBC Act on the 21st of December 2018 (Reference: 2018/8383) through the s.87 accreditation provisions. The DoEE determined on 28th March 2019 that the Proposed Action was a "Controlled Action" under s.75 of the EPBC Act. The EPBC Act referral 2018/8383 considered the relevant controlling provisions to be National Heritage Places (sections 15B & 15C), Listed Threatened Species and Communities (sections 18 & 18A); Listed Migratory Species (Sections 20 & 20A) and Commonwealth Marine Species (sections 23 &24A).

Additional legislation relevant to surface water management on the Project includes, but is not limited to:

- *Environmental Protection Act 1986*
- *Environment Protection and Biodiversity Conservation Act 1999 (Cwth)*
- *Rights in Water and Irrigation Act 1986*
- *Soil and Land Conservation Act 1945*
- *Waterways Conservation Act 1976*
- *Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007*
- *Environmental Protection (Concrete Batching and Cement Product Manufacturing) Regulations 2004*
- *Environmental Protection (Unauthorised Discharge) Regulations 2004*
- *Planning and Development (Local Planning Schemes) Regulations 2015*
- *Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes, Perth, Western Australia. Department of Water and Environmental Regulation (DWER), 2015.*

In addition to the above legislation, this SWMP will be developed and regularly reviewed to comply with the commitments and legal obligations arising from the Project's environmental approvals process. The review and revision process is to be done in consultation with the Murujuga Aboriginal Corporation.

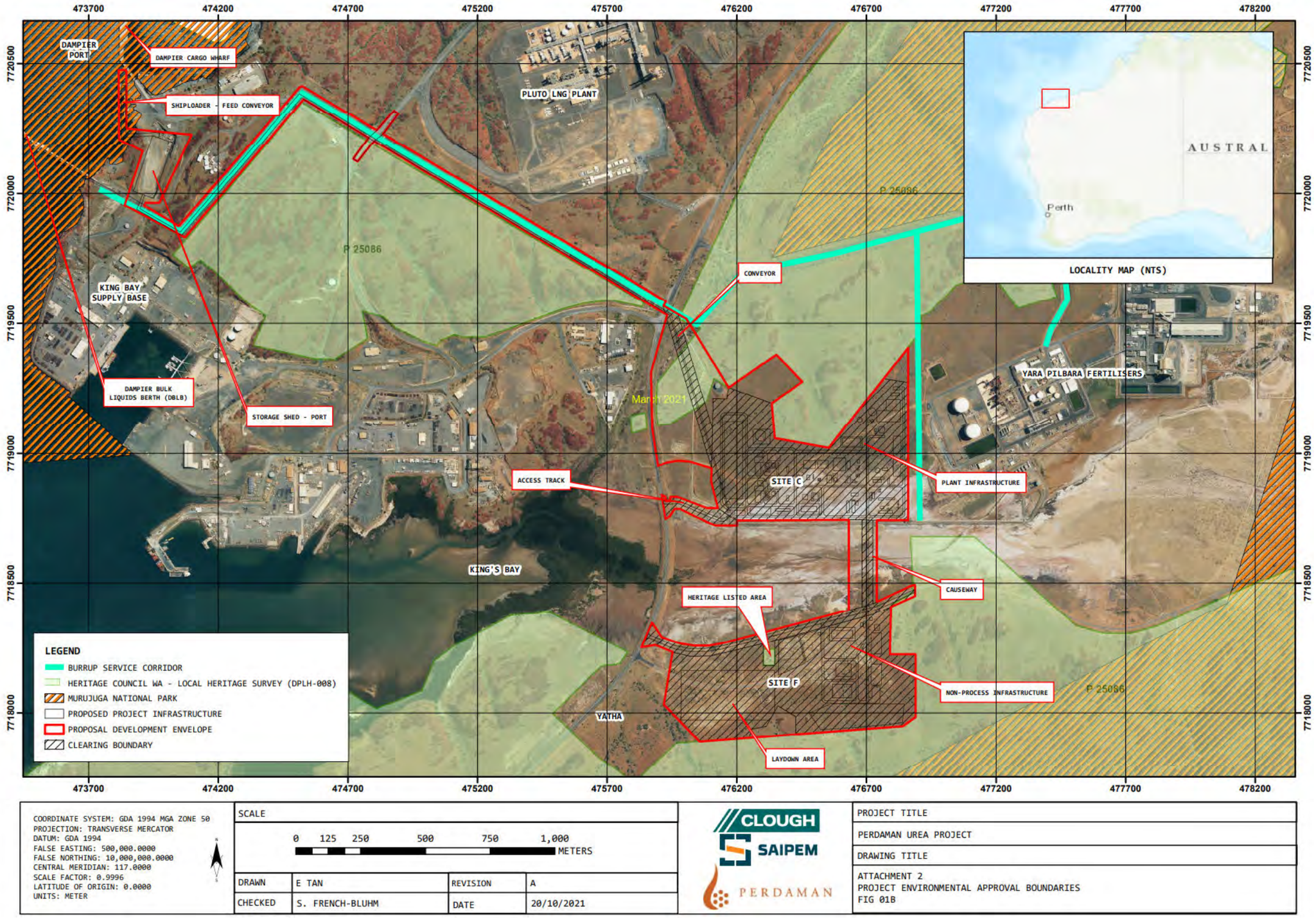

Figure 1-2 Development Envelope & Infrastructure

1.2 Key Environmental Factors

Perdaman has identified five environmental factors that specifically link with surface water values on the Project. This Plan has been developed to meet the objectives of the EPA's environmental factors as outlined in Table 1-1. The relevance of these environmental factors to the Project is presented in Table 1-3.

Table 1-1 Project environmental factors and potential impacts

Environmental Factor	Potential Impacts
Inland Waters	The proposal could impact on the EPA's environmental objective for inland waters (including groundwater, surface water and acid sulfate soils) from construction and operation through: • impacts to surface water quality from stormwater run-off and project infrastructure • impacts to groundwater from potential abstraction • potential impacts to surface water and groundwater as a result of the disturbance of acid sulphate soils These impacts are mitigated primarily through: limits of development envelope and footprint (Condition 1, MS 1180); implementation of a Hydrogeological Management Plan if required (Condition 6, MS 1180); implementation of the Confirmed Surface Water Management Plan (PCF-PD-EN-SWMP) (Condition 8, MS 1180); and management of acid sulfate soils in accordance with Condition 7, MS 1180.
Flora and Vegetation	The proposal could impact on the EPA's environmental objective for flora and vegetation from construction and operation through the: • clearing of 73.05 ha of vegetation within the 106.7 ha development envelope during construction will directly impact on flora and vegetation values • introduction and/or spread of weeds • altered fire regimes • altered surface water and groundwater flow regimes • impacts from emissions from the urea plant. These impacts are mitigated primarily through: limits of development envelope and footprint (Condition 1, MS 1180); implementation of the Confirmed Flora Management Plan (PCF-PD-EN-FMP) (Condition 4, MS 1180); payment of offsets (Condition 11, MS 1180); implementation of a Decommissioning and Rehabilitation Plan (Condition 13, MS 1180); and, implementation of an Air Quality Management Plan (Condition 2, MS 1180).
Terrestrial Fauna	The proposal could impact on the EPA's environmental objective for terrestrial fauna (including listed Migratory/Marine bird species) from construction and operation through: • noise, vibration, and light • removal of breeding, nesting and foraging habitats and the introduction of predators • habitat disturbance and fragmentation of fauna habitats as a result of construction • entrapment, injury or death during construction and operations • inadvertent injury and/or mortality as a result of vehicle strikes form increased traffic during construction and operations • injury and/or mortality as a result of increase waste material during construction and operations • impacts to ghost bat (*Macroderma gigas*), north-western free-tailed bat (*Mormopterus cobourgianus*), northern quoll (*Dasyurus hallucatus*), Pilbara olive python (*Liasis olivaceus barroni*), and migratory bird species. These impacts are mitigated primarily through: limits of development envelope and footprint (Condition 1, MS 1180); implementation of the Confirmed Flora Management Plan (PCF-PD-EN-FMP) (Condition 4, MS 1180); implementation of the

	Confirmed Fauna Management Plan (PCF-PD-EN-FaMP) (Condition 5, MS 1180); implementation of the Confirmed Threatened Species Management Plan (PCF-PD-EN-TSMP) (Condition 5, MS 1180); payment of offsets (Condition 11,MS 1180); and, implementation of a Decommissioning and Rehabilitation Plan (Condition 13, MS 1180).
Coastal Processes	The proposal could impact on the EPA's environmental objective for coastal processes from construction of the causeway interconnecting Sites C and F: • disruption to tidal water flow movements within the King Bay / Hearson Cove supratidal to intertidal flat area impacting on intertidal and supratidal vegetation and benthic communities, including the King Bay mangrove community. This impact is mitigated through: causeway culvert flow velocity limit (Condition 1, MS 1180); and, implementation of the causeway design.
Marine Environmental Quality	The proposal could impact on the EPA's environmental objective for marine environmental quality from operation through: • the discharge of saline water (brine) and wastewater into King Bay via the existing Water Corporation Multi-User Brine Return Line (MUBRL) • deposition of air emissions (urea dust from Site C) and spillages of urea product and fugitive urea dust during ship loading and conveying of urea from the storage shed to the ship loader entering the marine environment. These impacts are mitigated primarily through: Limits and extent of the proposal requiring wastewater disposal through the MUBRL (Condition 1, MS 1180); and, implementation of a Part V Works Approval and Licence.

Table 1-3 provides an overview of the Inland waters factor and potential impacts to these values during implementation of the Project, particularly the construction phase. Section 1.2 of this SWMP further describe the environmental values and potential impacts to surface waters during Project CERES. Section 1.2.1 summarises the surface water values and existing surface water environment that may be impacted by Project activities.

1.2.1 Inland Water Values and Existing Environment

The Project area (shown in Figure 1-2) extends east-west approximately 3.4km covering about 105 hectares. The Project Development Envelope can be separated into five key areas, being including Sites C & F, the causeway, conveyor and Port storage and loading facilities. Each area has specific surface water issues associated with its location or proposed activities as summarised in Table 1-3.

Maintaining compliance with the EPA factor objective for Inland Waters (see Section 5) requires competency in the understanding of the hydrogeological features relevant to each site within the development envelope of the Project, as well as the regional hydrogeological context of the Burrup Peninsula. This will include knowledge of site-specific characteristics as well as the hydrology, elevation, slope, groundwater and site rainfall characteristics including additional geotechnical information and consideration of the potential presence of acid sulfate soils.

1.2.1.1 Hydrology

Regional hydrological mapping shows a number of watercourses flowing into King Bay to the east of Sites C and F. These ephemeral streams only flow occasionally, typically as a result of major rainfall events between December and April.

Although no ephemeral creeks are noted to pass through the Site C area, there are a number that are positioned to the north of this area, which may produce run-off into the Site C area during high rainfall events. Two surface water pools have been noted that are positioned around 900 m to the north and 1.3 km to the northwest of the Site C area, respectively (Coffey, 2022b). The closest permanent surface water bodies to the proposed site areas are features of the marine environment, namely King Bay, located around 700 m east of the site at its closest point and Hearson Cove, (Indian Ocean) located 2 km west of the site (Coffey, 2022b).

On Site C, stormwater runoff is reported to flow primarily from the north, where willow bedrock hinders infiltration, runoff is typically conveyed in small flows, potentially resulting in small alluvial deposits at the base of the slopes.

During significantly high tide (spring tide) events, supratidal waters are known to extend from the western part of the peninsula from King Bay over to the eastern coastal area and discharge into Hearson Cove.

Hydrology of the Project location is shown in Figure 1-3.

1.2.1.2 Site Rainfall Characteristics

The average rainfall in the Burrup region is 259.9mm per annum. The wettest months of the year are January, February and March averaging 47.7mm, 75.4mm and 47.3mm respectively (see Table 1-2). The most extreme rainfall events are a consequence of the tropical cyclones which generate between 25% and 34% of the annual rainfall near the Pilbara coast.

Cold fronts moving east across the southern section of Western Australia can reach as far north as the Pilbara resulting in light winter rains in May and June.

Rainfall is expected to directly infiltrate through the soils to recharge groundwater, evaporate at the surface or be consumed by vegetation in the root zone. Overland flow will occur during wet periods with the mudflats draining westward into King Bay. During heavy rains and extreme spring tides, the tidal mudflats between Sites C and F are subject to flooding and inundation (Coffey, 2022b).

Table 1-2 Rainfall statistics for Karratha Aero (Source: Bureau of Meteorology, 2021).

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	47.6	78.7	46.7	17.6	28.5	34.6	14.3	4.0	1.2	0.4	1.3	15.0
Median	20.6	44.6	31.4	6.3	13.0	12.4	3.4	0.1	0.0	0.0	0.0	0.6
Highest Daily	212.4	210.6	190.8	107.0	107.4	209.4	66.6	28.2	15.4	6.0	37.8	112.8

1.2.1.3 Hydrogeology & Groundwater Quality

The main aquifer in the area is the Pilbara Fractured Rock Aquifer consisting of Precambrian granite greenstone terrain overlain by superficial sediments in river valleys. These fractured aquifers are usually of low permeability with limited storage with yields controlled by the position, extent and size of fracturing. Superficial sediments may act as perched aquifer bodies where geological conditions allow this.

Superficial groundwater beneath the Site is present within an unconfined clay, sandy clay or sandy gravel aquifer. Based on typical lithology/hydraulic conductivity estimates (Kruseman and de Riffer, 1991) the estimated groundwater velocity within the superficial aquifer beneath the Site is likely to be approximately 0.01 to 5 m/day (clay to sandy gravel). Groundwater velocity within the Gidley Granophyre will vary greatly dependent on the extent of fracturing, which will provide preferential flow paths and more rapid groundwater flow. Flow velocity may vary from almost 0 to 103 m/day (Coffey, 2022b).

Historical groundwater data is sparse for the area; however, several geotechnical investigations have been carried out on behalf of Perdaman and during the EIA process. The most recent of which were the baseline studies carried out in January to March 2022 by Tetra Tech (Coffey, 2022b).

The 140436-0000-4GER-0001 – Geotechnical Desktop Study conducted for the Project by SNC-Lavalin (2019), reported that the water quality within the mudflat region located in Site F was significantly saline which is typical given the intertidal nature of the supra-tidal flat, at salinity levels ranging from 76,000 to 78,000 µg/cm. Previous studies have confirmed groundwater quality to be hypersaline with TDS concentrations greater than seawater, (40,000-50,000 mg/L) which is thought typical of supratidal environments that are subject to greater evaporation rates, (HLA Envirosciences, 1999).

Coffey noted (2022b) elevated levels of nutrients in both groundwater and surface water at locations that were mainly in proximity to the Yara Pilbara Nitrate (YPN) Plant in the eastern section of Site C, within the causeway area between Site C and Site F and in the central and western area of Site F where it is understood that a former laydown area existed. In groundwater, there were exceedances relative to adopted criteria for Ammonia, TN and TP. The source of TN is thought to be from both organic and inorganic sources (faecal matter and nitrogen-based fertilisers) with TP likely to be mineral based and leached from soil and rocks.

Hydrocarbons were detected in groundwater at BH22 (Site C) and BH31 (Site F). When sampling BH22 it was noted that the sample was black in colour with a significant organic odour. Total Recoverable Hydrocarbons (TRH) was recorded at 0.22 mg/L however this was below adopted assessment criteria. The exact source of this contamination is unknown, but it is likely to emanate from the adjacent YPN plant located immediately to the east. BH31 showed a significant concentration of fuel oil or diesel oil hydrocarbons (11.6 mg/L) exceeding the relevant assessment criteria by a factor of 13. Again, the source is unknown however, as this site is located adjacent to Hearson Cove Road the contamination may represent a localised vehicle oil spill.

Heavy metals were detected in most groundwater samples across the site but were mainly below assessment criteria. The exceptions were Copper, Iron, Manganese and Zinc, which exceeded both ANZECC 2000 and DoH NPUG (2014) criteria in BH12, BH22, BH31, MW01 and MW06. The source of this contamination is unknown but is likely to be consistent with regional groundwater quality.

PFOS was detected by Coffey (2022b) in all samples except MW02, MW03 and MW07-2 and exceeded the interim 99% marine species criteria within two samples (BH22 and BH31) exceeding interim 95% marine species criteria. Again, the source of PFAS and PFOS is thought to be the YPN plant located upgradient of the site to the east.

The pH (field) in groundwater across the Site ranged from 5.91 pH units in MW05 to 7.78 pH units in MW10 suggesting that groundwater has a relatively neutral pH across the site with no current acidification.

Groundwater levels are noted to be particularly shallow within the supratidal areas and are noted to be expressed as surface waters during periods of high rainfall. Groundwater levels are also noted to be particularly affected by tidal variation in this area and this is very likely to affect groundwater flow direction with groundwater flow likely to be reversed during periods of high tide (Coffey, 2022b). Historical investigations undertaken for Site C by Soil and Rock Engineering in 1999 found that groundwater levels ranged from 0.7 to 2.8m below ground surface. The shallowest reading of 0.7m was located within the supra-tidal flat area. The most recent baseline investigations carried out by Tetra Tech Coffey (2022b), recorded static water levels (SWLs) ranging from 0.41 mBTOC (MW09) to 21.61 mBTOC (MW04) (refer to **Appendix E** for monitoring well locations).

During the Coffey (2022b) baseline groundwater monitoring, the following physiochemical parameters were recorded for site groundwater conditions.

- Reduction (redox) potential (Eh) measurements were seen to range from -68.6 mV to -169.2 mV within wells that were primarily screened within the granophyre bedrock showing predominantly reducing conditions.
- Electrical conductivity ranged from 5,206 µS/cm to 189,810 µS/cm indicative of brackish to hypersaline conditions.
- Field pH measurements ranged from pH 6.56 to pH 7.76 indicating circum-neutral groundwater conditions.

The potential impact on groundwater as a consequence of the Project's activities include percolation of contaminants into groundwater from the stormwater sump on Site F and unsealed areas across the site. Should groundwater be contaminated, there is also the potential to contaminate the supra-tidal flat through seepage.

1.2.1.4 Surface Water Quality

Based on the gauging information collected during the baseline hydrogeological assessment by Coffey (2022b), groundwater levels are very close to surface within the supratidal areas and with surface waters in this area likely to be a surface expression of groundwater during high rainfall events and high tides.

In surface waters, only Total Phosphorus (TP) and Total Nitrogen (TN) exceeded adopted criteria at 0.02 mg/L and 0.25 mg/L respectively. The source of nitrogen is thought to be organic in nature with phosphorous naturally occurring from soils in the supratidal area.

Concentrations of CoPC's in surface water samples were reported as non-detect or below laboratory limits of reporting in all samples with the following exceptions:

- Total Nitrogen was reported at concentrations of 2.8 mg/L and 1 mg/L respectively, with both reports exceeding the adopted assessment criteria of 0.25 mg/L
- Total Phosphorus was reported at concentrations of 0.22 mg/L and 0.07 mg/L respectively, with both reports exceeding the adopted assessment criteria of 0.02 mg/L.

Concentrations of PFAS compounds in surface water samples were reported as non-detect or below laboratory limits of reporting with the following exceptions.

- SW4. PFBS was reported at a concentration of 0.002 ug/L
- SW4 and SW5. PFBA was reported at concentrations of 0.123 ug/L and 0.0165 ug/L respectively
- SW4 and SW5. PFPeA was reported at concentrations of 0.698 ug/L and 0.0765 ug/L respectively
- SW4 and SW5. PFHxA was reported at concentrations of 0.0586 ug/L and 0.0611 ug/L respectively
- SW4 and SW5. PFHpA was reported at concentrations of 0.018 ug/L and 0.0178 ug/L respectively
- SW4 and SW5. PFOA was reported at concentrations of 0.0017 ug/L and 0.0029 ug/L respectively

PFAS was detected in surface waters in the supratidal zone in the eastern section of Site C downgradient of the Yara fertiliser plant, which is thought to be the source of these detections however, there were no exceedances relative to adopted criteria.

Sources of nutrients and PFAS in groundwater and surface water are thought to emanate from the YPN plant located upgradient to the east of the site with hydrocarbon contamination noted to be very localised in nature within the granophyre bedrock only. This would suggest that the actual Perdaman site itself does not pose a significant risk to environmental values of the surrounding area including groundwater and surface water. In particular it should be noted that where TRH was identified in groundwater (BH22 and BH31) the wells were noted to be particularly low yielding. As a result of this and the likely localised nature of the contamination, this is unlikely to pose a risk to both surrounding groundwater and the wider environment. The low permeability of the granophyre bedrock with the absence of obvious fracturing in this area will result in significant retardation of this localised contamination, which is likely to mean that contamination will have likely degraded prior to impacting any significant receptor (i.e. superficial deposits or surface waters).

Furthermore, it should be noted that the low yielding nature of the granophyre bedrock limits its viability for use with only small amounts of water available in areas where factures and weathering are prevalent. The salinity of groundwater

within the superficial aquifer also limits its environmental value and suitability for a variety of uses other than industrial and marine ecosystems. Therefore, the limited contamination identified within groundwater on site is considered to pose a low risk to the surrounding area and environmental values (Coffey, 2022b).

1.2.1.5 Acid Sulfate Soils

Acid Sulfate Soils (ASS) are naturally occurring soils, sediments and peats that contain iron sulfides, predominantly in the form of pyrite materials. These soils are commonly found in low lying land bordering the coast, in estuarine and saline wetlands, and in freshwater groundwater dependent wetlands throughout Western Australia.

In an anoxic state, these materials remain benign, and do not pose a significant risk to human health or the environment. However, the disturbance of ASS within the Project area and its exposure to oxygen, has the potential to cause significant environmental and economic impacts including fish kills and loss of biodiversity in waterways, contamination of groundwater by acid, arsenic, heavy metals and other contaminants and corrosion of concrete and steel infrastructure by acidic soil and water.

There is a reported potential presence of ASS within the southern section of Site C and within the supra-tidal flat area, associated with the causeway. The potential ASS is categorised as Class 1 with a high to moderate risk of ASS occurring within 3m of the natural soil surface. Due to the historical disturbance of soil and rock for a laydown area in Site F, there is minor potential for ASS to exist or develop in that area.

Tetra Tech Coffey carried out a Detailed Site Assessment for ASS (Coffey, 2022a) in accordance with the requirements of the Department of Water and Environmental Regulation (DWER) guideline *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes* (DWER 2015) in January 2022, as required by Condition 7-1 of the Ministerial Statement (1180). The assessment noted, no actual acidity exists in the form of S-TAA indicating that there is no soluble and exchangeable acidity within the soil profile. Potential acidity is present at the Site, due to 99% of soil samples displaying soil pHFOX values greater than pH 6.0 with equivalent %S content between 0.032-0.341 %S. No samples recorded a pHF to pHFOX change or delta greater than 3.0 which amplifies potential acidity issues for the Site (Coffey, 2022a).

The Coffey Report (2022a) stated that groundwater chemistry in the area generally indicated a hydrogeological system that has a low vulnerability to acidification in its undisturbed state. ASS indicators that suggest minimal influence from historical acidification and a relatively low vulnerability to acidification include groundwater pH values within a neutral range across the site, low acidity values at most locations i.e. <40 mg/L, and high to very high alkalinity indicating some inherent buffering capacity is naturally present.

Dissolved aluminium is a key indicator of historical oxidation of sulfide minerals (i.e., pyrites) and was not detected in groundwater wells except at BH22 and MW10 with concentrations of 0.05 mg/L and 0.02 mg/L respectively. These minor detections are below ASS criteria. The chloride: sulfate ratios complied with DWER acidification guidelines across the site indicating a groundwater system that has not been affected by oxidation of sulfides (Coffey, 2022a).

In the event that unexpected acid sulfate soils are disturbed during the implementation of the Project, the OWNER shall treat and manage acid sulfate soils in accordance with the requirements of the Department of Water and Environmental Regulation (DWER) guideline *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes* (DWER 2015), as per Condition 7-2 of the Ministerial Statement (1180). Treatment and management measures for potential acid sulfate soils have been provided in Table 2-2, in case of unexpected disturbances, to satisfy Condition 8-2(2) of MS 1180. These measures have been provided in accordance with the DWER guidelines*: Identification and investigation of acid sulfate soils and acidic landscapes*, and *Treatment and management of soil and water in acid sulfate soil landscapes*.

Dewatering may cause disturbances to ASS on site and thus Condition 6-2 of MS 1180 requires the OWNER to develop a hydrogeological management plan in the case that dewatering is required. Results of supplementary detailed hydrogeological studies informed that dewatering will not be required for the Project (Coffey 2022b), and thus a Hydrogeological Management Plan will not be developed. Justification for excluding dewatering and associated ASS management actions in this Plan is provided in **Attachment J**, and the hydrogeological report is provided in **Attachment I**.

The location of potential acid sulfate soils that may be disturbed during the Project is shown in Figure 1-7 below.

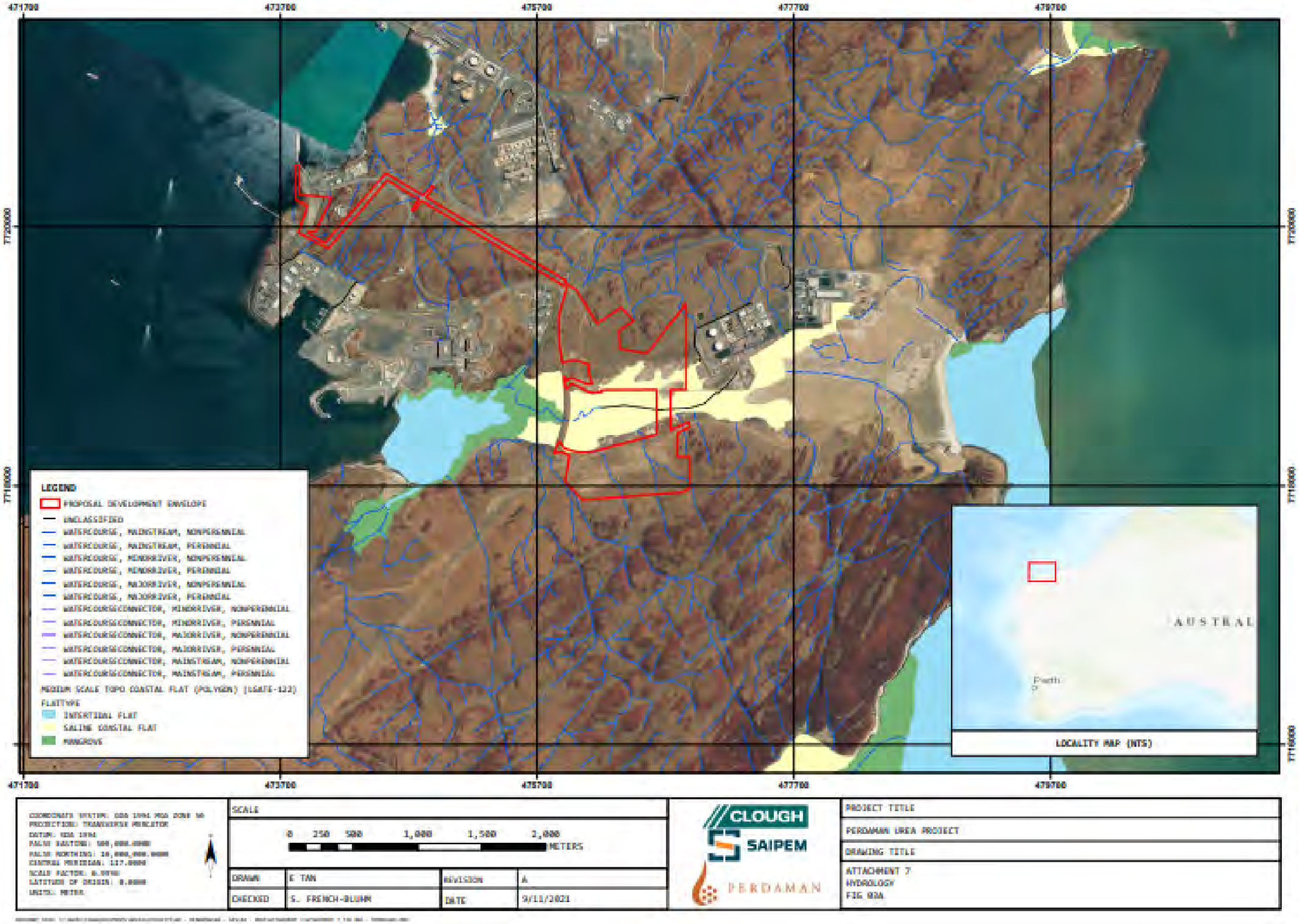

Figure 1-3 Hydrology Map of the Project Location

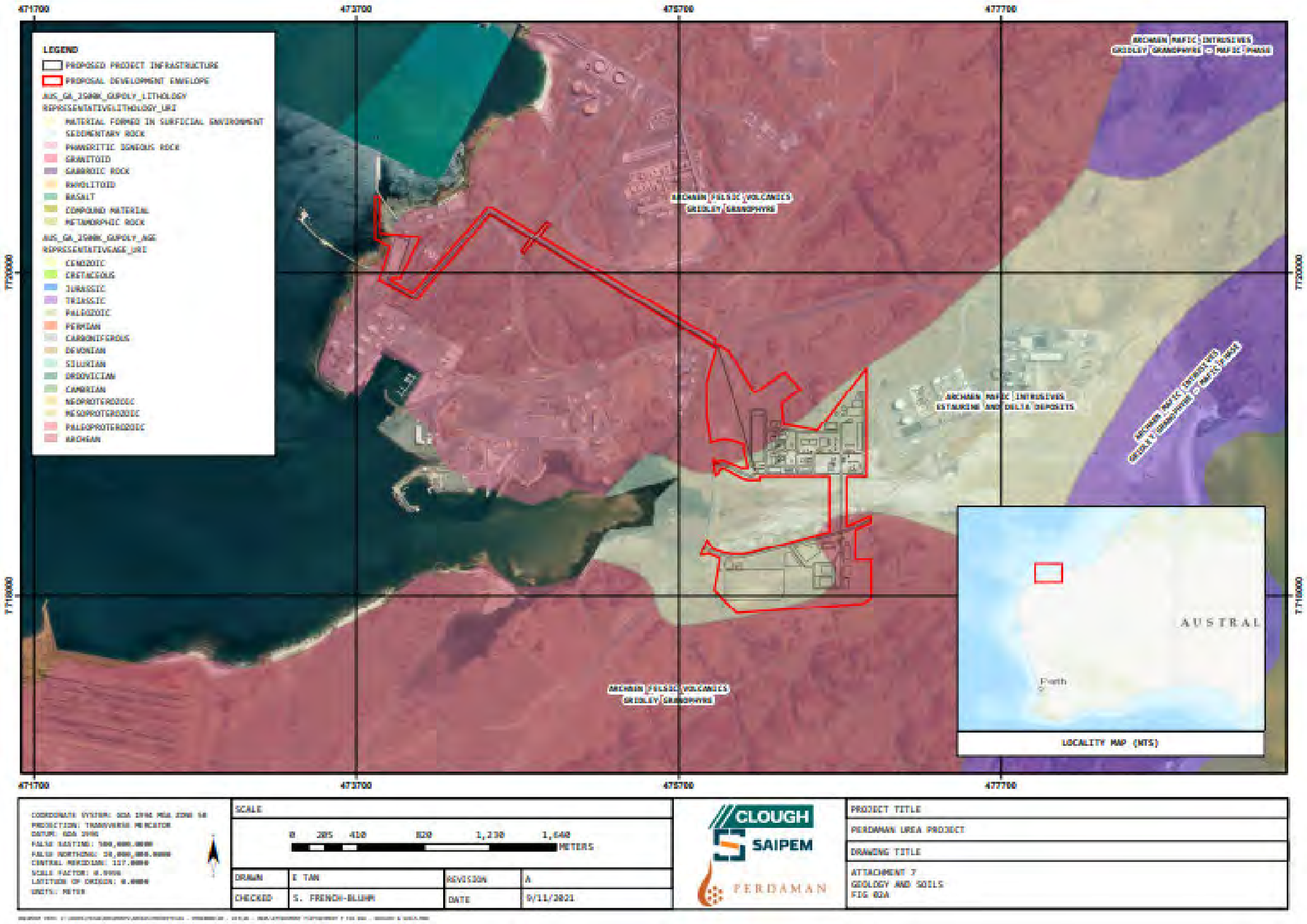

Figure 1-4 Geology and Soils of the Project Location

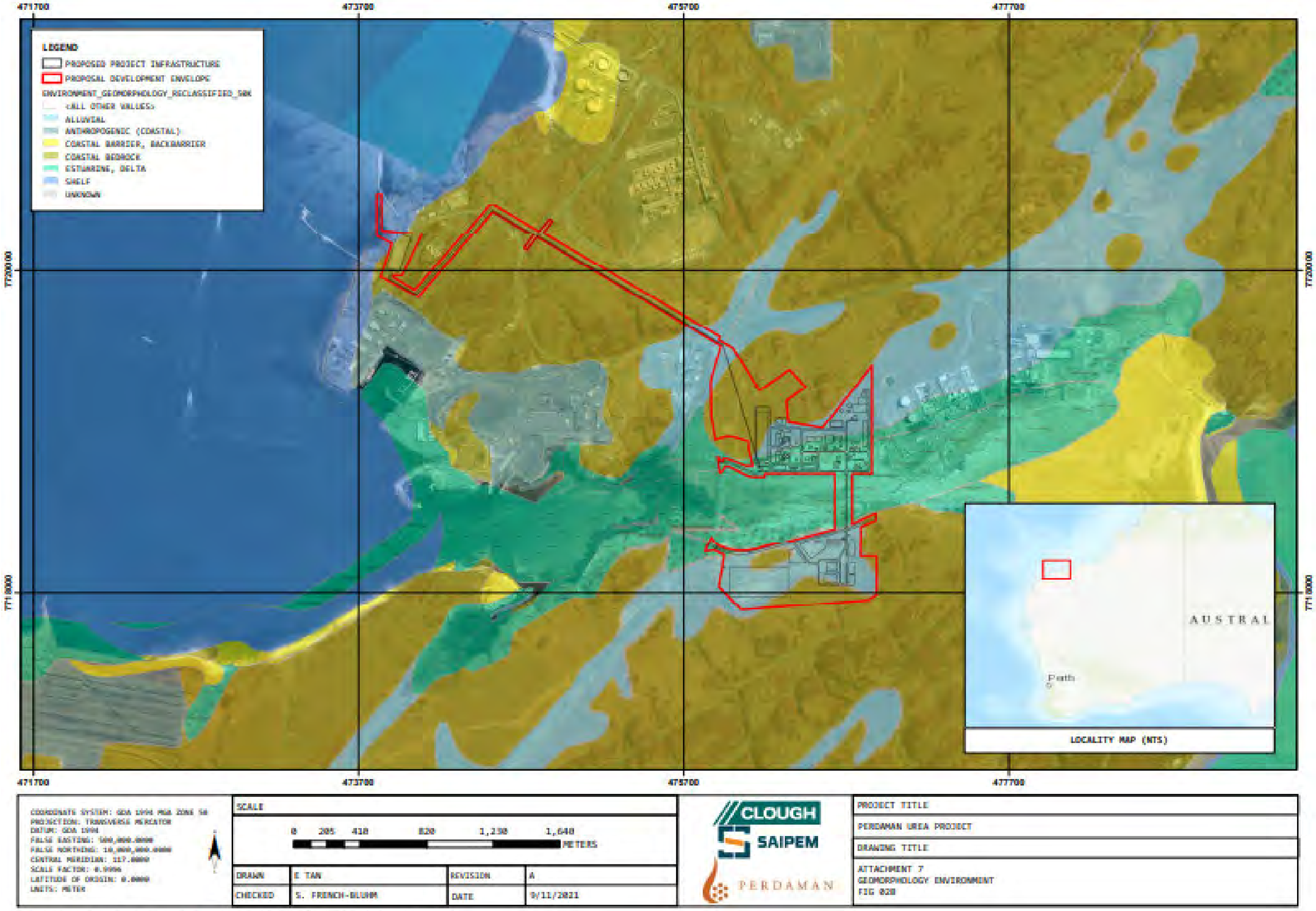

Figure 1-5 Geomorphology of the Project Location

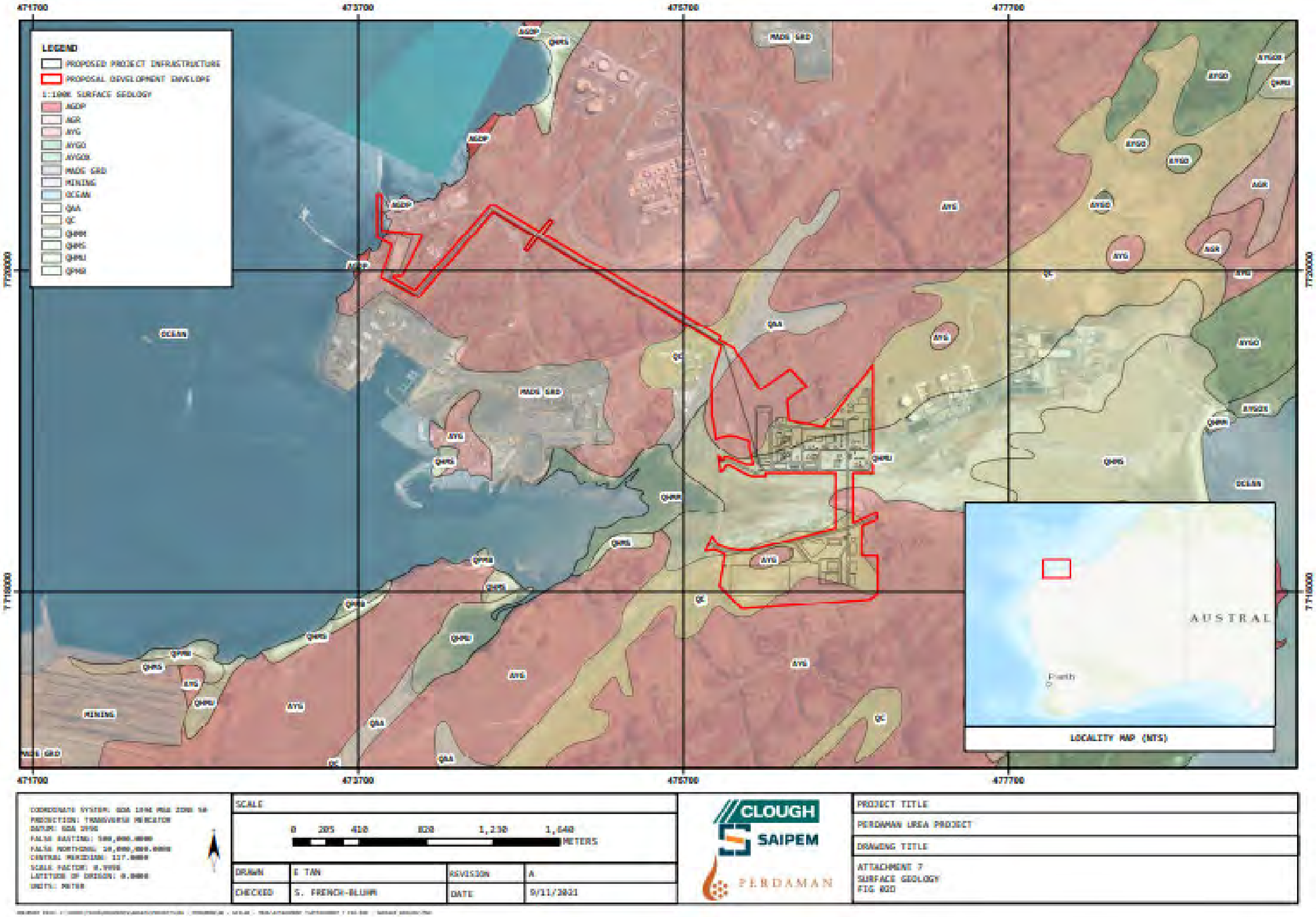

Figure 1-6 Surface Geology of the Project Location

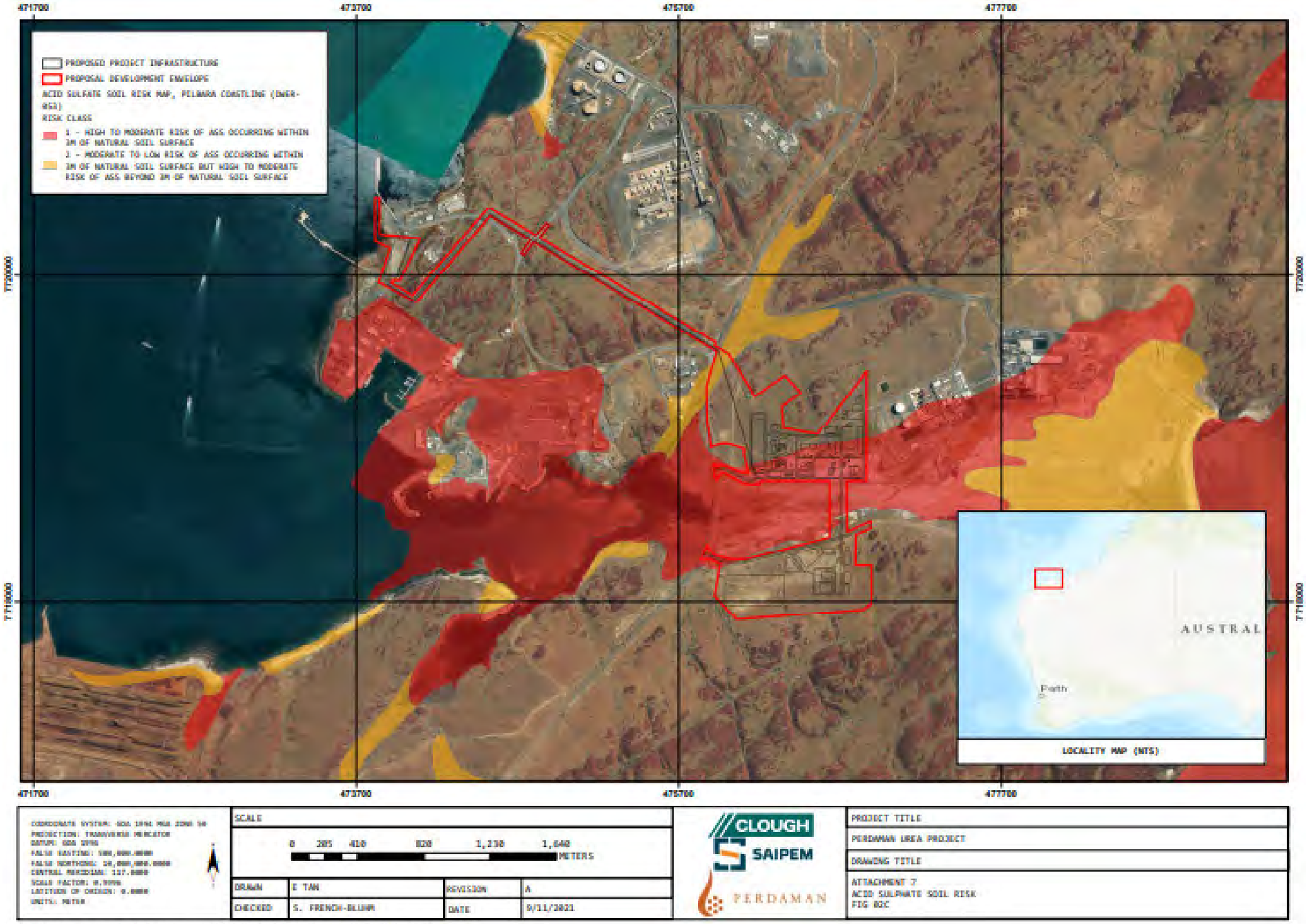

Figure 1-7 Potential Acid Sulfate Soils of the Project Location

1.2.1.6 Elevation & Slope

Site C

Site C slopes from approximately 28m AHD in the north-west to 2m AHD at its lowest point on the southern boundary. As shown in **Attachment A - Project Surface water Schematic and Plot Plan**, the battery limits of the Project will avoid the steeper and higher areas in the north-west.

During the earthworks phase, the majority of the Site C which will contain the urea production plant and storageshed will be cut and filled to a level of approximately 6m AHD. The north-east sector which includes the desalination and demineralisation plants will be tiered at approximately 10m AHD.

The catchment area to the north of the site drains towards the southern boundary and an ephemeral creek lineon the west portion of the site.

Initial earthworks will include a surface water diversion system to redirect natural runoff around the Project siteand into the supra-tidal flat area.

Site F

Site F slopes generally from south to north from approximately 12m to 28m AHD along the southern boundary, down to approximately 6m and 10 m AHD respectively at the northern boundary, adjacent to the supra-tidal flat area.

Where possible permanent infrastructure and laydown areas will avoid the higher, steeper areas along the southern boundary.

Causeway

The supra-tidal flat area slopes from about 4m AHD at its lowest point. The causeway will be a formation built up to approximately 6m AHD as it extends across the supra-tidal flat area and is then graded to join at the finished levels of Sites C and F.

Conveyor

The eastern segment of the conveyor route starts at approximately 8m AHD at the southern transfer station, up to 18m AHD as it extends north, then back down to approximately 8m AHD at the northern transfer station.At this point it is routed through an existing culvert under Burrup Road where it follows the EWSC which risesfrom 8m up to approximately 62m AHD at its highest point.

The conveyor will follow the EWSC which drops down to approximately 21m AHD where it borders the southernsection of the existing quarry which will contain the Project's Port storage shed.

Port Area

The floor level of the Port storage shed located in the existing quarry will be built up from natural ground level of approximately 5m AHD up to approximately 10m AHD.

The ship loader will be constructed on the wharf which will be built by PPA.

1.2.2 Potential Impacts

Potential Impacts have been summarised in Table 1-3.

The Project is located on the Burrup Peninsula directly adjacent to the Murujuga National Park and within the Pilbara bioregion of the Interim Biogeographical Regionalisation for Australia (IBRA) classification and the Roebourne IBRA sub-region, of which only 3.45% is currently reserved for conservation.

The EPA (EPA Report 1705, 2021) considers that the likely residual impacts of the Project on inland waters are:

- impacts to surface water quality from stormwater run-off and project infrastructure, which is unlikely to be material.
- impacts to groundwater from potential abstraction and saline wastewater discharge to the Water Corporation's Multi-User Brine Return Line (MUBRL), which is likely to be consistent with the EPA objective for inland waters, provided appropriate management measures are implemented.
- potential impacts to surface water and groundwater from the disturbance of acid sulfate soils, which is likely to be consistent with the EPA objective for inland waters, provided appropriate management measures are implemented.

Project CERES's location within a coastal area supports a distinct correlation between the surface waters and groundwater environment. The main aquifer bodies (refer to Section 1.2.1.3 above) is overlain with supratidal deposits and both are considered to be unconfined in nature and in hydraulic connection with groundwater discharge within the intertidal zone (Coffey, 2022b). Previous studies have supported this with confirmed groundwater quality to be

hypersaline with TDS concentrations greater than seawater (HLA Envirosciences, 1999). Groundwater levels are noted to be particularly shallow within the supratidal areas and are noted to be expressed as surface waters during periods of high rainfall.

Groundwater levels are also noted to be particularly affected by tidal variation in this area and this is very likely to affect groundwater flow direction with groundwater flow likely to be reversed during periods of high tide (Coffey, 2022b).

Due to this distinct correlation between groundwater and surface water and in consideration of the EPA Environmental Factor for "Inland Waters" groundwater and surface water impacts are considered and addressed through this SWMP.

Table 1-3 Environmental Impacts to Inland Waters by Project Activities.

Key Environmental Factor – Inland Waters *"To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected."*		
Project Activities Impacting Surface Waters & Groundwater	**Surface Water, Groundwater & Associated Values**	**Potential Impact**
Flora & Vegetation Factor, Terrestrial Fauna Factor – Clearing, grubbing, excavations, cut & fill)	Fresh water quality maintaining health of surrounding ecosystems and supporting fauna which utilise these ecosystems. Natural drainage channels and temporary watercourses supporting local vegetation and habitat values for conservation significant fauna. Natural microbial presence, composition, and distribution in soil layers. Natural topsoil chemistry and formation of soil horizons. Natural species richness and composition of seeds within topsoil/subsoil.	Short and long-term alteration of surface drainage and water flow pathways, including surface, ground and tidal water flow to supratidal vegetation. Elevated levels of suspended solids or contaminants in surface water runoff affecting the health of surrounding vegetation and associated fauna habitat, foraging and food sources. Changes to topsoil and subsoil chemistry may hinder rehabilitation survival rates. Increased turbidity of surface waters. Low risk (however still some risk) of exposing ASS during works within Site F, including potential heave and expulsion of pore water and stockpiling ASS material. ASS exposure has potential to cause significant environmental and economic impacts including fish kills and loss of biodiversity in waterways. ASS exposure may cause contamination of groundwater by mobilisation of acids, arsenic, heavy metals and other contaminants and corrosion of concrete and steel infrastructure by acidic soil and water.
Flora & Vegetation Factor – Loss & clearing of native vegetation	Natural drainage channels and temporary watercourses supporting local vegetation and habitat values for conservation significant fauna. Natural chemistry and composition of topsoil/subsoil from leaf litter and natural sources of decomposed organic matter.	Increase in erosion rates. Increased turbidity of surface waters. Changes to groundwater levels due to the removal of riparian vegetation, potentially impacting hydrological and hydrogeological functions and processes. Changes to topsoil and subsoil chemistry may hinder rehabilitation survival rates.
Flora & Vegetation Factor, Terrestrial Fauna Factor – Construction of access tracks, laydown and hardstand areas Infrastructure construction	Natural drainage channels and temporary watercourses supporting local vegetation and habitat values for conservation significant fauna.	Stormwater may be contaminated by fuels, concrete or other potentially hazardous chemicals. Contaminated stormwater run-off may enter the environment. Increased erosion around constructed areas; especially during major storms where run-off is turbulent and concentrated. Inadequately designed access tracks may inhibit natural surface water flows or increase erosion rates. Though considered unlikely, due to design adopted, construction of access tracks (including the causeway and activities in lower elevations and

"To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected."

Project Activities Impacting Surface Waters & Groundwater	Surface Water, Groundwater & Associated Values	Potential Impact
		intertidal areas) may instigate the disturbance of acid sulfate soils. Elevated levels of suspended solids or contaminants in surface water runoff affecting the health of surrounding vegetation and associated fauna habitat, foraging and food sources. A decrease in infiltration from rainfall and surface to groundwater.
Coastal Process Factor, Fauna Factors - Construction of the Causeway	Conservation significant marine birds and waders that utilise the samphire shrublands / supratidal flat habitats, including (but not limited to): Curlew Sandpiper Red Knot Lesser Sand Plover Bar-tailed Godwit Australian Fairy Tern Great Knot Eastern Curlew King Bay mangrove community. Natural drainage channels and temporary watercourses supporting local vegetation and habitat values for conservation significant fauna.	Impacts to tidal water flow movements within the King Bay / Hearson Cove supratidal to intertidal flat area, restricting rewetting and drying regimes and potential drying out and oxidation of ASS. Erosion from tidal flows (after disturbance of the area) may cause sediment deposition, impacting intertidal and supratidal vegetation and benthic communities, including the King Bay mangrove community. Increased turbidity of surface waters surrounding the causeway. Causeway construction exhibits risk of ASS disturbance, impacting marine water quality and samphire habitat for conservation significant marine birds and waders. Potential changes to tidal flows (restricting rewetting and drying regimes and potential drying out and oxidation of ASS.
Stockpiling imported raw materials, and local topsoil and subsoils during construction.	Natural microbial presence, composition and distribution in soil layers. Natural topsoil chemistry and formation of soil horizons. Natural species richness and composition of seeds within topsoil.	Run-off from stockpiles may cause sedimentation and deposition of foreign/introduced/contaminated material into the environment (particularly ASS stockpiles) Elevated levels of suspended solids or contaminants in surface water runoff affecting the health of surrounding vegetation and associated fauna habitat, foraging and food sources. Changes to topsoil and subsoil chemistry may hinder rehabilitation survival rates. Increased turbidity of surface waters.
Coastal Processes and Inland Waters Factors – Storage and handling of chemicals, hazardous materials and wastewater during construction of the causeway and / or other areas onsite.	King Bay mangrove community. Fresh water quality maintaining health of surrounding ecosystems and associated fauna, including conservation significant marine birds and waders that utilise the samphire shrublands / supratidal flat habitats, including (but not limited to): Curlew Sandpiper Red Knot Lesser Sand Plover Bar-tailed Godwit Australian Fairy Tern Great Knot Eastern Curlew	Potential for spills or leaks to contaminate the surrounding surface water values within and surrounding the site. Potential for spills or leaks to contaminate surrounding soils and impact natural chemistry. Pollution Impacts to the supratidal zones (Hearson Cove and King Bay) during the construction of the proposed causeway between sites F and C. Potential impacts to the mangrove communities at King Bay where spills and contaminants are delivered to the supratidal to intertidal areas Changes to topsoil and subsoil chemistry may hinder rehabilitation survival rates.
Coastal Processes and Inland Waters Factors –	Fresh water quality maintaining health of surrounding ecosystems and	Stormwater or wastewater run-off from the concrete batching site have the potential to contaminate the

"To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected."		
Project Activities Impacting Surface Waters & Groundwater	**Surface Water, Groundwater & Associated Values**	**Potential Impact**
Construction and operation of the concrete batching plant	supporting fauna which utilise these ecosystems.	surrounding surface water environment. Sediment laden/alkaline water entering surrounding stormwater / drainage onsite and exiting site Alkaline washout impacting soil chemistry/ groundwater and associated nearby receptors Fines and penalties associated with Schedule 1 substances being discharged (Environmental Protection [Unauthorised Discharges] Regulations 2004). Changes to topsoil and subsoil chemistry may hinder rehabilitation survival rates. A decrease in infiltration from rainfall and surface to groundwater.
Flora & Vegetation, Fauna, Coastal Processes and Inland Waters Factors – Short- and Longer-term potential impacts to inland waters post construction	Fresh water quality maintaining health of surrounding ecosystems and supporting fauna which utilise these ecosystems. Natural drainage channels and temporary watercourses supporting local vegetation and habitat values for conservation significant fauna. Natural microbial presence, composition and distribution in soil layers. Natural topsoil chemistry and formation of soil horizons. Natural species richness and composition of seeds within topsoil/subsoil. Conservation significant marine birds and waders that utilise the samphire shrublands / supratidal flat habitats King Bay mangrove community.	Permanent alteration of surface drainage and water flow pathways, including surface, ground and tidal water flow to supratidal vegetation; Ongoing decrease in infiltration from rainfall and surface to groundwater within the Project site; Redirection and redistribution of surface water runoff volumes from hardstand surfaces into a managed system; Degradation of water quality from elevated levels of suspended solids or contaminants in surface water runoff; Increased turbidity of surface waters due to soil erosion and/or the transport of mobilised sediments from excavation activities (i.e. cut and fill) and imported fill material; Increased acidity within surface and groundwater from disturbance of Potential Acid Sulfate Soils (PASS); Undetected leaching of ASS material into surface and/or groundwaters, causing deleterious long-term impacts. Contamination of surface and groundwater due to accidental spills of hydrocarbons / chemicals used during construction; Regional stormwater flows from the catchment flowing through the supratidal flats to the Burrup Road Causeway Culvert; and Indirect impact on the mangrove communities of King Bay as a result of potential water quality changes.

"To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected."		
Project Activities Impacting Surface Waters & Groundwater	**Surface Water, Groundwater & Associated Values**	**Potential Impact**
Flora and Vegetation, Fauna, Coastal Processes and Inland Waters Factors – Project design elements disturbing ASS or PASS material.	Fresh surface and ground water quality maintaining health of surrounding ecosystems and supporting fauna which utilise these ecosystems. Natural microbial presence, composition and distribution in soil layers. Natural topsoil chemistry and formation of soil horizons. King Bay mangrove community. Conservation significant marine birds and waders that utilise the samphire shrublands / supratidal flat habitats	Impacts to soil and water properties if ASS is disturbed. Acidic corrosion of construction materials. Release of dissolved metals (i.e., aluminium) and oxidised sulfates. Contamination of surrounding flora and vegetation, leading to vegetation health decline and potential causes of indirect impacts to fauna utilising the impacted habitat(s). Leachate transported downstream to the supratidal flats and to King Bay through tidal movements.

With surface water potentially impacted by various hydrogeological factors, the assessment and maintenance of geological profiles of the area will be consistent with the objective outlined by the Minister for the Environment, as explained in Section 1.3 below.

1.2.3 Risk Assessment

Perdaman applied a standard risk assessment matrix to its operations, whereby the 'likelihood' and 'consequence' of events is considered, with management and mitigation actions identified to control the level of risk. The overall risk register for geotechnical and geoenvironmental risks were compiled by SNC-Lavalin during the geotechnical desktop study for the Project. In addition, a risk and mitigation table is provided within **Appendix 2A** of this SWMP.

1.3 Ministerial Statement 1180 Requirements

Pursuant to section 45 of the *Environmental Protection Act 1986* (EP Act), it has been agreed that Project CERES, as described in Section 1.1 of this Plan and subject to changes approved under Section 43A of the EP Act on March 20th 2020, February 10th 2021, and May 13th 2021 may be implemented subject to the implementation conditions and procedures detailed therein.

Appendix 1 details the Ministerial Statement Conditions relating to Surface Waters and in which Section of the SWMP each Condition is addressed.

As the Project has the potential to impact aspects with both State and Federal significance, the respective regulatory bodies (EPA and DCCEEW) have imposed Conditions associated with environmental approval (MS 1180) for the Project. The OWNER must ensure all details and procedures included in this management Plan are in alignment with the Conditions provided, and commencement of construction activities are not to proceed until permission has been granted in writing, by the CEO.

Permission will only be granted if the most recent version of the Plan is updated in consultation with MAC and addresses the following (as per Condition 8-2):

- Demonstrates how the environmental objective in Condition 8-1 will be achieved;
- Specifies the treatment and management of potential acid sulfate soils in accordance with the requirements of Conditions 7-1 and 7-2;
- Specifies trigger criteria that will trigger the implementation of management and/or contingency actions to prevent direct or indirect impacts;
- Specifies threshold criteria to demonstrate compliance with Condition 8-1;
- Specifies monitoring methodology to determine if trigger criteria and threshold criteria have been met;
- Specifies management and/or contingency actions to be implemented if the trigger criteria required by Condition 8-2(3) and/or the threshold criteria required by Condition 8-2(4) have not been met; and

- Provides the format and timing for the reporting of monitoring results against trigger criteria and threshold criteria to demonstrate that the objective in Condition 8-1 has been met over the reporting period in the Compliance Assessment Report required by Condition 15-7.

The EPA requires the OWNER to maintain the hydrological regimes and quality of surface water so that environmental values are protected.

In addition to Condition 8 (Surface Water) requirements stated above, the OWNER has included the requirements of Condition 6-1 (MS 1180) within this Confirmed Surface Water Management Plan due to the correlation between the groundwater and surface water environment within the Project area. Condition 6-1 states:

The OWNER shall implement Project CERES to meet the following environmental objective:

- (1) minimise project attributable impacts on groundwater quality, flow direction and/or depth to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected

The rationale for not addressing all requirements associated with Condition 6 of MS 1180 have been detailed within Section 1.6.3.1 of this Confirmed Surface Water Management Plan.

This Confirmed Surface Water Management Plan is submitted in accordance with MS 1180, **Condition 8** for the Project. As required under **Condition 16-1**, this Plan will be made publicly available for the life of the Project. The requirement of these Conditions and where they are addressed in this Plan are presented in **Appendix 1**. These Conditions and procedures are set out under section 44(2) of the *EP ACT 1986* to be followed for the implementation of this Project.

Perdaman shall not commence any Ground Disturbing Activities until the CEO of the EPA has confirmed in writing that the **Confirmed** Surface Water Management Plan satisfies the requirements listed in Condition 8-2 of MS 1180 and as noted above.

1.4 EP Act Part V Condition Requirements

On 16 November 2021, the applicant submitted an application for a works approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act) for the construction of a concrete batch plant and mobile crushing and screening plant to support construction of the urea plant. As a result of the assessment, on 14 July 2022, works approval W6630/2021/1 was granted in writing by the CEO.

Bulk earthworks associated with the urea plant will include the use of a mobile crushing and screening plant for processing rock excavated from the site. Processed rock material will be used as fill to level the site in preparation for construction of the urea plant and pavement materials for site roads. The mobile crushing and screening plant will be used at various locations within the prescribed premises boundary (shown in W6630/2021/1). The mobile crushing and screening plant will only operate at locations within the approved disturbance footprint – clearing boundary. Excavated material will be stockpiled up to 5m in height near the mobile crushing and screening plant.

Information provided in the application indicates that concrete from the concrete batching plant will be used within the Project development envelope, which approximately represents the premises boundary for the urea production facility once operational. The *Environmental Protection Regulations 1987* (EP Regulations) defines the activity of concrete batching as prescribed as being:

Concrete batching or cement products manufacturing: premises on which cement products or concrete are manufactured for use at places or premises other than those premises.

Therefore, the concrete batching plant proposed by the applicant does not meet the description of category 77 and is not a prescribed activity for regulation under Part V of the EP Act. On the 28 February 2022 the applicant requested to remove category 77 from the works approval application and as a result, concrete batching activities have been excluded from assessment in this report (refer to section 2.4).

Noting the above, the premises relates to category 12 and the assessed production / design capacity under Schedule 1 of the EP Regulations which are defined in works approval W6630/2021/1 (Attachment L). The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guideline: Risk Assessments* (DWER 2020) are outlined in works approval W6630/2021/1.

1.5 RIWI Act Bed and Banks Permit Requirements

During Project construction there will be interference with the beds and banks of a watercourse to construct a causeway. The causeway has been designed to accommodate project related infrastructure, and provide access between Site C and Site F.

The Project requires a permit under the *Rights in Water and Irrigation Act 1914,* to interfere with the beds and banks of a water course. The OWNER has obtained this permit for the Perdaman Urea Plant causeway construction, Permit Number PMB209045(1) (issued by the Department if Water and Environmental Regulation on 21 August 2023), which allows the following:

- Construction of a causeway to provide access between Site C and Site F of the Perdaman Urea Project.

- Duration of Permit is from 21 August 2023 to 20 August 2025.

The Permit is subject to the following terms, conditions and restrictions:

- The permit holder shall ensure that the works does not act as an artificial barrier or levee, causing water to pond upstream.

1.6 Rationale & Approach

In accordance with Condition 8-2 of Ministerial Statement 1180, trigger and threshold criteria are required to be established with reference to baseline survey data. Environmental criteria 2 will be set using groundwater and surface water baseline survey data collected by Coffey in January 2022 and the EPC Contractor shall conduct ongoing groundwater and surface water monitoring for that section in accordance with this Plan.

It is intended that trigger criteria provide an advance warning that threshold criteria may be exceeded, which requires trigger criteria to be set below the corresponding threshold criteria.

The following sections provide more detail and background on this approach for the environmental criteria.

1.6.1 Survey and Study Findings and Requirements

Several geotechnical studies have been conducted to date. SNC-Lavalin prepared a geotechnical desktop study which was issued for information in April of 2019. SNC-Lavalin recommend that after completion of geotechnical site investigations and geological mapping, an interpretive geotechnical report should be prepared. The interpretive report will supersede the desk-top study and the Project design should then be revised considering the site-specific geotechnical information.

In 2020, the EPC engaged Coffey to conduct a geotechnical study of Project CERES between Village Road and Hearson Cove Road, in Burrup, WA. The findings of this report are presented in a combined factual / interpretive report dated 7 October 2020 (Ref. 754-PERGE271567-R05), refer to **Attachment D and E** for complete reports.

At least six months prior to Ground Disturbing Activities, the OWNER was required (by Condition 6-2) to provide the CEO with the results of supplementary detailed hydrogeological studies undertaken by or on behalf of the OWNER to quantify baseline groundwater quality, groundwater flow directions, and the depth to groundwater beneath Sites C and F, and such studies shall meet the requirements of:

- Department of Water 2009, Operational Policy No. 5.12 - Hydrogeological reporting associated with a groundwater well licence, Department of Water, Perth, November 2009; and
- EPA Victoria 2006, Hydrogeological Assessment (Groundwater Quality) Guidelines, September 2006

Hydrogeological assessments commenced in December 2021 and the first groundwater monitoring event was planned for February 2022. The hydrogeological studies were completed by Coffey in March 2022 (Coffey, 2022b) and results are presented in **Attachment I**, the findings of the report serve as baseline groundwater quality data to be utilised during the Projects groundwater monitoring program throughout construction and operations.

In addition to the requirement of hydrogeological studies, the OWNER was required by Condition 7-1 of MS 1180 to undertake intrusive acid sulfate soils investigations in accordance with the DWER guideline *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes* at least six months prior to Ground Disturbing Activities. If acid sulfate soils are identified on site, it is the requirement of this Plan to specify the treatment and management as per Condition 8-2(2) of the Ministerial Statement and in alignment with DWER's guideline on the treatment and management of soil and water in acid sulfate soil landscapes.

In accordance with Condition 7-1 of MS1180, an ASS investigation was conducted in general accordance with *DWER 2015 guidelines*, where ASS was identified as occurring within the supratidal zone of Site C and the causeway. The Coffey Detailed Site Assessment for ASS (2022a) noted the following findings:

- No actual acidity exists in the form of S-TAA indicating that there is no soluble and exchangeable acidity within the soil profile.
- Analysis for maximum peroxide 'oxidisable' sulfur present in the soil (SPOS) exceeded the DWER ASS guideline of 0.03 %S in nine samples, and
- Potential Acid Sulfate Soils have been confirmed, however are located within the Supratidal zones.

Further to those findings Coffey concluded (2022a) regarding groundwater:

- Chloride:sulfate ratios indicate groundwater has not been affected by oxidation of sulfides,
- Hydrogeological system has a low vulnerability to acidification based on groundwater chemistry,
- Low acidity and high alkalinity concentrations indicating minimal influence from historical acidification and inherent buffering capacity, and
- Dissolved aluminium concentrations generally below detection with only two samples detected below relevant criteria

Both the Coffey Detailed Site Assessment for ASS (2022a) (refer to **Attachment H**) and the Baseline Hydrogeological Assessment (2022b) have been used to confirm Project CERES's requirements around Acid Sulfate Soil management and treatment and dewatering management. This is discussed further within Section 1.5.5.1 and justified in **Attachment J**. **Attachment H** and **Attachment I** include copies of the investigation reports and findings.

See **Appendix 2A** for the environmental risk assessment for the Project, which includes updated information for surface water values and risk and in addition ASS risks.

1.6.1.1 Geotechnical Information

Geotechnical information for all Project areas can be found in 140436-0000-4GER-0001 – Geotechnical Desktop Study (Attachment C) of this Plan. In addition, information has been referenced from the Coffey Perdaman Urea Geotechnical Investigation (Interpretive Report) prepared for Clough on the 17 November 2020 (**Attachment D**) and the combined factual / interpretive report dated 7 October 2020 (Ref. 754-PERGE271567-R05) (**Attachment E**).

1.6.2 Trigger & Threshold Criteria

Rationale for location specific threshold criteria are based on applicable guidelines or baseline criteria. A summary of the framework for setting groundwater and surface water threshold and trigger criteria is provided in Table 1-4. This criterion is applied per analyte per site monitored. Further trigger and threshold values for groundwater have been summarised within **Table 2-8.**

Table 1-4 – Surface Water & Groundwater Trigger & Threshold Criteria Framework

Scenario	Threshold Criteria	Trigger Criteria
Parameter other than pH		
All baseline values are less than the guideline value	Set at 115% of trigger criteria.	Set at guideline value.
Two or more baseline values is equal to or exceeds the guideline value	Set at one standard deviation above maximum baseline value.	Set at 75th percentile of baseline dataset.
pH		
Upper Limit	Set at upper trigger criterion plus 1.	Set at maximum baseline value plus one standard deviation.
Lower Limit	Set at lower trigger criterion minus 1.	Set at minimum baseline value minus one standard deviation.
Groundwater Level		
Depth to Groundwater (mBTOC) and (mAHD).	Set at the minimum baseline groundwater level minus one standard deviation recorded at each groundwater monitoring site.	Set at the minimum baseline groundwater level at each groundwater monitoring site.

Note: Baseline values for groundwater and surface water trigger level and threshold levels within **Attachment I appendix E.**

Trigger criteria are set to ensure the trigger level actions can be implemented well in advance of the environmental outcome being compromised. Threshold criteria are framed to measure achievement of the environmental outcome. Failure to meet threshold criteria signals the environmental outcome is not being met.

1.6.2.1 Method for Setting Water Quality Analyte Threshold Criteria

Threshold criteria for each analyte shall be set separately. Groundwater and surface water threshold criteria shall also be set separately. Triggers and threshold levels will be set using the relevant guidelines

If baseline levels of an analyte recorded at one or more survey sites exceed the guideline value. Where the maximum baseline value equals or exceeds the guideline value, a site-specific threshold criterion will be set at one standard deviation of the baseline dataset above the maximum value for the site. The standard deviation and maximum of the baseline dataset are calculated after discarding outliers from the dataset. The maximum value of the dataset is representative of baseline characteristics within the system. Adding one standard deviation (representing the dispersion of the data set from the mean) to the baseline maximum, and also considering the low range between minimum and maximum values at most locations, will allow for assessment of deviation from threshold levels whilst at the same time reducing the risk of triggering a Type II error; i.e., the risk of claiming a pollution event is acceptable.

A modified method for determining threshold criteria applies for pH, which requires a range to be set. A site-specific lower threshold criterion for pH is set at the lower trigger criterion minus 1. The upper threshold criterion is set at the upper trigger criterion plus 1. This method is consistent with DWER guidance for managing acid sulfate soils (DWER, 2015), which recommends adopting a deviation of 1 from "baseline values" as a threshold for increased management.

Baseline values are taken in this context to be equivalent to the baseline range, which are represented by the baseline maximum (or minimum) plus (or minus) one standard deviation.

Standard deviations, maxima and minima will be calculated after discarding outliers from the dataset. Outliers will be excluded in accordance with the statistical method suggested in the Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC and ARMCANZ, 2000b), where results more than four standard deviations from the mean may be considered outliers.

1.6.2.1 Method for Setting Water Quality Analyte Trigger Criteria

Trigger criteria for each analyte shall be set separately. Groundwater and surface water threshold criteria are also set separately.

With reference to the baseline survey, trigger criteria may be greater than the relevant limits of reporting (LOR). Where trigger criteria are set below the LOR, future laboratory analyses must be amended to ensure the LOR is lowered for future monitoring rounds.

If baseline levels of an analyte recorded at one or more survey sites exceeds the guideline value, a site-specific trigger criterion shall be established. Adopting methodology presented within ANZECC and ARMCANZ (2000), a site-specific trigger shall be calculated using the 75th percentile of the baseline value as a trigger.

It is noted that ANZECC and ARMCANZ (2000) recommends the application of the median as trigger criteria in the absence of 24 months of data. However, this is not considered a suitable trigger mechanism for this Project. The application of the mean as the trigger level will result in 50% of the data requiring trigger level actions to be implemented and the risk of triggering a false Project-attributable pollution event (Type I error).

A modified method for determining trigger criteria applies for pH, which requires lower and upper limits to be set. Trigger criteria are set individually for each site. The lower trigger criterion shall be set at the minimum baseline value minus one standard deviation and the upper trigger criterion shall be set at the maximum baseline value plus one standard deviation. Minimum and maximum baseline values and standard deviations shall be calculated on a site-by-site basis

1.6.3 Management Approach

The management approach of this SWMP has been informed by best practice and the expectations within the environmental Conditions stated within MS 1180 and has been informed by the various geotechnical studies undertaken for the Project area (refer to section 1.5.1). The primary approach taken focusses on avoiding potential impacts through design and planning mechanisms.

To ensure that management provisions are comparable to the risks, Perdaman has adopted an outcome-based and objective-based approach to achieve the desired environmental outcome for surface and groundwater values. Table 1-5 briefly lists the elements adopted within each approach and is further described below and within Sections 2.1 and 2.2 of this Plan.

Table 1-5 Overview of Management Approach

Management Approach	Key Elements of the Approach
Outcome – Based	Trigger criteria, threshold criteria, response actions (trigger level actions and threshold contingency actions), monitoring (including indicators), timing/ frequency of monitoring, and reporting.
Objective - Based	Management actions, management targets, monitoring and reporting.

Where the impacts are unavoidable, the management approach includes provisions to identify **triggers** that detect when inland water values are at risk; **threshold criteria** to quantify the maximum allowable impact before the environmental outcomes presented in Section 2.1 are exceeded and **management actions** to minimise the duration, intensity or extent of the potential impact to surface water which are presented in Section 2.2.

In addition, implementation of an Environmental Management System (EMS) Framework provides a structure for achieving the key environmental objectives during the construction and operational phases of the Project. Implementation of the EMS Framework ensures environmental performance is achieved through environmental management practices that are consistent with the Perdaman Environmental Policy and Objectives. Management measures and actions are specifically detailed within this Plan (Section 2.2) and then reiterated within the Erosion, Sediment & Control and Water Quality Management Protocol within the PEMP. The Perdaman Environmental Management Protocols have been developed to address the environmental risks posed by the Project and its associated construction and operational based activities.

The Project has carried out a risk assessment specific to inland water values and potential impacts from construction and operations (refer to Appendix 2), additionally this risk assessment includes mitigation measures to be implemented that will aim to avoid, reduce and minimise environmental impacts to surface water within and adjacent to the Project Development Envelope (PDE).

1.6.3.1 Management Approach to ASS and Dewatering

The primary management objective during construction in relation to ASS and dewatering is to avoid and eliminate the need for excavating ASS / PASS and avoid the need for extracting groundwater during excavations through adoption of construction methods and design strategies which aid in achieving this objective. In accordance with condition 7-1 of MS1180, an ASS investigation was conducted in general accordance with *DWER 2015 guidelines*, where ASS was identified as occurring within the supratidal zone of Site C and the causeway. In 2022 the EPC Contractor (Saipem & Clough) engaged Tetra Tech, Coffey to conduct a Detailed Site Assessment for Acid Sulfate Soils.

The Coffey Detailed Site Assessment for ASS (Coffey 2022a) findings are summarised as follows:

- **No** actual acidity exists in the form of S-TAA indicating that there is no soluble and exchangeable acidity within the soil profile.
- Analysis for maximum peroxide 'oxidisable' sulfur present in the soil (SPOS) exceeded the DWER ASS guideline of 0.03 %S in nine samples, and
- Potential Acid Sulfate Soils have been confirmed, however are located within the Supratidal zones
- The soil is heavily buffered by high alkalinity versus a relatively low total acidity.

Ground disturbance activities associated with construction will involve earthworks or cut and fill activities where soil and rock from above 4 mAHD across Site C and above 10 mAHD across Site F will be excavated and used as fill material for the construction of a causeway running between Site C and Site F. Areas of the Site where earthworks are at most risk of disturbing ASS include the southern half of Site C and the causeway (Coffey, 2022a).

The causeway design has also been reviewed to minimise disturbance of ASS or the requirement to dewater during construction. The construction of the causeway connecting Sites C and F across the supratidal flats shall be built on grade and will not require the need to excavate or dewater. The supratidal flats area is known to be subject to flooding from storm surge events (S 4.2 Environmental Review Document, Cardno, March 2020). The lower elevations of both Sites C and F are required to be raised above +6m AHD which will comprise between 1 and 4m of fill.

No Actual or Potential Acid Sulfate Soils (AASS and PASS respectively) are present within the EPC Contractors "cut" locations (refer to **Appendix 3** for locations against the ASS risk and identified areas). However, deep excavations are required for installation of services and therefore interactions with AASS and/or PASS is expected.

Two samples within the causeway footprint were identified as PASS (Coffey, 2022a). The base of the causeway is 2 mAHD which is existing ground surface level within the supratidal and intertidal zone. Approximately three meters of sand bedding will be applied above this level with concrete culverts embedded within sand to permit the flow of stormwater from east to west across the supratidal and intertidal areas of the Site. A compacted fill layer 1.7 m thick will then be placed on top of the sand bedding layer to provide a base for final causeway road layers such as crushed aggregate and asphalt. Fill material will be used primarily on top of sand bedding to stabilise the causeway surface before final layers such as crushed aggregate, granular materials and asphalt are applied. The finished grade will be 6.15 mAHD.

W. There is a reported potential presence of ASS within the southern section of Site C and within the supra-tidal flat area, associated with the causeway. The potential ASS is categorised as Class 1 with a high to moderate risk of ASS occurring within 3m of the natural soil surface. Due to the historical disturbance of soil and rock for a laydown area in Site F, there is minor potential for ASS to exist or develop in that area. In accordance with Condition 7-2 (MS1180) an Acid Sulfate Soils Management Plan has been prepared providing the overarching environmental management requirements for the identification, management, treatment, storage, stockpiling, validation and disposal of ASS and Potential Acid Sulfate Soils (PASS). The ASSMP (PCF-PD-EN-ASSDMP) should be read in conjunction with this SWMP.

Due to dewatering no longer being a requirement for the Project, the OWNER is not obligated to develop a **Hydrogeological Management Plan** in accordance with Condition 6-3 of MS 1180.

If ASS is disturbed during the implementation of the Project, the OWNER shall treat and manage ASS in accordance with the requirements of the (DWER 2015) and the Confirmed Acid Sulfate Soils Management Plan. When acid sulfate soils are disturbed on site, it is the requirement of this Plan to specify the treatment and management as per Condition 8-2(2) of the Ministerial Statement and in alignment with DWER's guideline on the treatment and management of soil and water in acid sulfate soil landscapes.

Table 2-2 of this Plan summarises the best practise management and treatment that the OWNER will carry out *where* ASS is encountered. Where it is encountered, Condition 8-2 (2) and Condition 7-1 and 7-2 of MS1180 will be applied to the Project works accordingly and this Plan will be reviewed and updated.

1.6.4 Monitoring Approach

The purpose of implementing a monitoring program is to inform, through the environmental criteria, if the environmental outcomes and objectives (Conditions 6-1 & 8-1) are being achieved and if required, to determine when trigger level or threshold levels are exceeded. The exceedance of trigger or threshold criteria then informs which contingency

management measures need to be implemented. This further discussed in Section 2.3 of this document, outlining how the OWNER will undertake monitoring to determine performance against the environmental criteria outlined in the outcome and objective-based provisions (see Sections 2.1 and 2.2).

A statistical approach based on a BACI (before – after - control – impact) design will be used to provide objectivity and rigor to thresholds and triggers. The BACI approach is to sample 'Before' and 'After' an impact activity has commenced, to determine how the activities will change the condition of a site from its historical condition, whilst Control and Impact sampling will enable the effects of activities to be discerned from natural variation and other events. BACI designs are useful where there are large potential changes after impact and where changes may be permanent after impact. This approach is consistent with rigorous monitoring programs and for monitoring programs undertaken elsewhere in the Pilbara.

Monitoring will occur during construction and post-construction. In accordance with condition 8-4 of Ministerial Statement 1180, monitoring will continue to be implemented until the CEO of the DWER has confirmed by notice in writing that the Project has demonstrated that the objective detailed in condition 8-1 has been met.

All monitoring will be undertaken to provide for a representative dataset capturing natural variations, with the preferred timing to be executed during the dry season and extending throughout the wet season so as to capture predicted fluctuations of chemical composition due to movement of water through the soils of varying physical and chemical structure. In the case of areas at potential risk from waterlogging, monitoring in April to June after the wet season is required as waterlogging effects are more likely to be expressed during this period. Refer to monitoring provisions within Section 2.3.2 and 2.3.3 of this Plan.

An effective monitoring program may be adaptive over time, dependent on quality and quantity of data collected from each site, with innovations in monitoring techniques and methodologies incorporated into program design over time. This would however be dependent on and be driven by the quality and quantity of data collected from each site, coupled with a periodic review of monitoring methods. Further, program design should be based on replicable sampling at impact and reference sites.

A set of preliminary monitoring parameters and methods have been selected to provide broad coverage of potential changes in surface water flow and quality that can be expected under a range of different construction and operational related impacts. The number of monitoring parameters will vary depending on the approval conditions and surface water dependent systems.

Surface water sampling should be conducted in accordance with AS/NZS 5667.1:1998 Water Quality- Sampling - Guidance on the design of sampling programs, sampling techniques and preservation and handling of samples and the Department of Water Field Sampling Guidelines: A guideline for field sampling for surface water quality monitoring programs.

Section 2.3 of this SWMP provides further details to the monitoring program, methods and parameters.

1.6.4.1 Baseline Monitoring

To account for natural variations in surface water quality and flow regimes, representative sampling of site must be achieved. This approach aligns with the BACI monitoring; ensuring that all variation is captured for more accurate inferences on the contamination source or sources of impact to surface waters on the Project. Baseline sampling for surface water quality will be conducted following significant rainfall events. To account for seasonal variation, water samples will be collected over a three-year period to ensure a statistically valid dataset of the sites water quality and spatial flow regimes.

Consideration must be given towards the sites spatial soil variations and profiles (physical and chemical), the weather conditions associated with the timing of sampling (in consideration of the effects of dilution / concentration of chemical parameters) and the locations where sampling occurs. These elements are to be considered to ensure that Perdaman are accountable for surface water contamination that occurs due to site activities and not a result of historic or existing conditions. This will also enable accurate baseline modelling to be achieved to help make better informed decisions regarding the treatment and management of potential contamination or variation to water quality as caused by site activities.

1.6.5 Rationale for Choice of Provisions

The rationale for the choice of management provisions including the trigger and threshold criteria, response actions, monitoring and reporting has been made partly on the basis of Ministerial Statement Condition 8 requirements. The EPA report 1705 (Assessment No. 2184) also provides recommendations pertaining to management / contingency actions in alignment with s.44 of the *Environmental Protection Act 1986* (WA). Additionally, the Environmental Review Document (2020) and associated investigations for the Project have informed the specific surface water regimes, correlating groundwater quality and surface water quality triggers and thresholds to ensure that the environmental objectives stated in Conditions 6-1 and 8-1 of MS 1180 are achieved. The Objectives relating to Inland Water management (Surface Water & Groundwater) is presented and detailed in Section 1.6.5.1 below.

The OWNER has also considered the EP Act environmental protection principals for the Project. These principles provide a guideline for decision making and advice to government on matters of environmental protection, and the principles considered for the inland waters factor will be the 'Principle of maintaining the hydrological regimes and quality

of surface water so that environmental values are protected'. In 2003, the EP Act was amended to include these principles and as such, it is now the object of the Act to protect the environment of the State having regard to these principles.

Exceedances of trigger and threshold criteria, summarized in Table 2-1 indicate the response action required to manage said exceedance. Exceedances will also warn management of associated rates of change in the environment as caused by the impact. Understanding environmental rates of change can assist in developing early warning indicators or predetermining potential exceedances during monitoring of trigger and threshold criteria.

It should be noted that consideration of impacts external to functions of the Project will be important, as natural impacts independent of the Project activity should not implicate the responsibility of the OWNER. However, awareness of external impacts may require mitigation through alignment with the OWNERs interests and/or environmental policy. These could include impacts from external land-use activities including tourism/recreation, industrial or cultural activities, as well as external environmental processes, such as weathering from heavy rains, dust as a result of high winds etc.

1.6.5.1 Objectives

The OWNER shall implement the Project to achieve the following environmental objectives:

Table 1-6 Ministerial Statement No. 1180 Inland Water Objectives

Condition	Objective
6-1 (1)	Minimise project attributable impacts on groundwater quality, flow direction and/or depth to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.
8-1 (1)	Maintain the hydrological regimes and quality of surface water so that environmental values are protected.

These objectives will be achieved through specific measures ensuring appropriate environmental management measures (in addition to monitoring) are implemented during the construction, commissioning and operation phases of the Project (life of the Project).

The specific targets and management actions associated with the Inland Waters (Surface Water & Groundwater) objectives stated above (Conditions 6-1 & 8-1) are detailed in Section 2.2 of this Plan. These Objectives have also been used to establish applicable environmental outcomes for surface waters and groundwater within the Project development envelope and the associated trigger, threshold and contingency actions to measure the Projects performance against the outcome and objective.

1.6.6 Key Assumptions & Uncertainties

Assumptions relating to surface water or design elements to manage surface water throughout this Plan include:

- That investigations conducted to-date have accurately recorded the existing environment in relation to inland waters within and adjacent to the Project.
- That conditions experienced during previous investigations were ideal for recording an accurate baseline of the inland water's environment, drainage patterns, natural flows etc.
- That the Project site will be subjected to a 1–100-year rainfall event, and thus the quantity of rainfall during such event will be incorporated into the design to prevent overflow of hold ponds, diversion channels and other stormwater management elements.
- The Conveyor Route adjacent to Site C (i.e., not within the existing pipeline easement) footings should be taken through the colluvium to found in the rock strata beneath, a site walkover of the route should be undertaken to confirm these assumptions and borehole investigations should be undertaken at the location of critical structures.
- This report assumes, in accordance with industry practice, that the site ASS conditions recorded by Coffey during intrusive ASS investigations recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation. Should further data be obtained that differs from the data on which the Coffey report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

2 Surface Water Management Plan Provisions

This Section of the SWMP sets out the provisions that will be implemented for the Project. This Plan outlines both outcome-based (Section 2.1) and objective-based (Section 2.2) provisions. All management requirements will be carried out during construction and operations and until the Perdaman Urea Plant is decommissioned and closed.

Due to variable surface water management requirements depending on the hydrological elements and Project activities across each site within the development envelope, Progressive Erosion and Sediment Control Plans will be developed for each project area as detailed in Section 2.2.

Surface Water Controls, Erosion and Sediment Pollution Controls, Site stormwater management and management of the storage and handling of fuels and hazardous substances are also detailed separately within this Section of the SWMP due to the differing approaches required to manage each aspect relevant to surface water management, however management actions and associated targets have been identified for each aspect and included within Table 2-2.

2.1 Outcome Based Provisions

The provisions within this Section are outcome based as specified by the Ministerial Statement (1180) requirements stated within Condition 8-2 (3)(4)(5)(6) and (7). Outcome based provisions are performance based and are used where a potential impact on the environment is conducive to objective measurement and reporting.

The EPA Conditions did not specify an outcome to which these triggers and threshold would apply, however the **objectives** stated in Conditions 6-1 and 8-1 requires demonstration of compliance through threshold criteria.

In the following Sections, Table 2-1 and Table 2-2 outline the legal requirements for the Project and provides detail of the Environmental Criteria (Triggers & Threshold criteria), Response Actions (and contingency actions), and Monitoring and Reporting required to ensure compliance with the specified objective. The objectives have been outlined in Section 1.6.5.1.

These triggers and contingency actions will be adopted to monitor and track impacts to local surface water and groundwater where controls and management measures are not employed or are effective. Exceedances to the threshold criteria presented in Table 2-1 require the response actions to be implemented to reduce the impact and potential damage to surface water and groundwater environment and to maintain objectives relevant to inland waters.

The triggers pre-empt a potential threshold exceedance. Trigger Level Actions including but not limited to the Table 2-1 and inspections/investigations on-site will be utilised where practicable to reduce the risk of reaching a threshold and the need to implement the contingency actions.

In the case that a trigger or threshold is exceeded as a result of Project activities (see Section 2.4.4 for contingency measures to be implemented), a report will be provided to the CEO within 21 days from the date of awareness of exceedance which contains; details of the management actions implemented against the threshold and their effectiveness; details of the cause for exceedance; any potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded; measures to prevent future threshold exceedances and measures to prevent, control or abate the environmental harm which may have occurred. The remaining threshold criteria is to be justified based on demonstrating that the outcomes will continue to be met through a better understanding and application of the management provision. Implementing these contingency actions upon a trigger or threshold exceedance satisfies Condition 8-5 of MS 1180.

Table 2-1 Inland waters Outcome-based Conditions (Triggers, Thresholds, Contingency Actions)

EPA Factors and Objectives	**Inland Waters** - To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.
Outcome/s	8-1 (1) Maintain the hydrological regimes and quality of surface water so that environmental values are protected. 6-1 (1) Minimise project attributable impacts on groundwater quality, flow direction and/or depth to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.
Key Environmental Values	Fresh water quality maintaining the health of surrounding ecosystems and supporting fauna which utilise these ecosystems. Natural drainage channels and temporary watercourses supporting local vegetation and habitat values for conservation significant fauna. Hydrological regime and correlation between the surface water and groundwater exchange and environment. Natural microbial presence, composition, and distribution in soil layers. Natural species richness and composition of seeds within topsoil/subsoil. Natural chemistry and composition of topsoil/subsoil from leaf litter and natural sources of decomposed organic matter.
Key Impacts and Risks	Degradation of hydrological regimes and quality of surface water.

ENVIRONMENTAL CRITERIA Trigger Criteria Threshold Criteria	RESPONSE ACTIONS Trigger Level Actions Threshold Contingency Actions	MONITORING Monitoring Indicators, Methods and Locations Timing & Frequency	REPORTING Under EPA Act DWER
Surface Water Flows			
Trigger Criterion 1: Presence of backwater or ponding of water from the edge of the development envelope over a period of two (2) consecutive days from the date ponding is identified at distances further than 6 m.	**Trigger Response 1:** Investigations will take place to identify the cause(s) of the exceedance(s). Such investigations may include confirmation of the integrity of site storage facilities, identification of plant failures and/or spills and assessment of general housekeeping etc. Investigate if the cause of change is due to construction or operation of the Project. If results are assessed to be likely due to construction or operation, the exceedance is considered to be project-attributable, and the trigger criteria are considered to have been exceeded. Where an exceedance of the trigger value is identified, increase monitoring frequency from 6 monthly to quarterly to assess trends or whether increase/exceedance is persistent. Identify additional measures to prevent the trigger level being exceeded in the future and to prevent reaching threshold. Once actions to address the identified exceedance(s) have been implemented, the OWNER shall monitor the effectiveness of the actions and shall continue until such time as they are advised by the CEO to cease.	**Indicator** Visual identification of backwater or ponding at site located upstream of the Project site on the Project Development Envelope. **Method** Site walkover / visual inspection Refer to Section 2.3 During site operations, the OWNER shall ensure that plant inspections, procedures and maintenance are sufficient to identify, prevent and/or minimise releases to the environment, which pose a risk to environmental values. If the exceedances are determined by the CEO to be attributable to site activities, the OWNER shall submit a report detailing the actions to be taken to address the exceedance(s) within 7 days of the OWNER being notified in writing of the determination made; **Locations** Refer to Section 2.3 **Timing & Frequency** Refer to Section 2.3.	**Trigger Reporting 1:** Monthly environmental reports as per Section 2.4.1. Document the trigger exceedance for later inclusion into the Environmental Performance Report and the annual Compliance Assessment Report (refer to section 2.4.2 and 2.4.3.)
Threshold Criterion 1: Presence of backwater or ponding of water from the edge of the development envelope over a period of two (2) consecutive days from the date ponding was identified at distances	**Threshold Contingency Actions 1:** Confirm the validity of result (i.e., review sampling procedures, review dataset). Investigate the cause of exceedance. Identify additional measures to prevent the trigger level being exceeded in the future. Identify and implement relevant alternative activities		**Threshold Reporting 1:** Where threshold criteria is exceeded: • The OWNER shall report the exceedance in writing to the CEO within seven days of the exceedance being identified as per Condition 8-5(1)

ENVIRONMENTAL CRITERIA Trigger Criteria Threshold Criteria	RESPONSE ACTIONS Trigger Level Actions Threshold Contingency Actions	MONITORING Monitoring Indicators, Methods and Locations Timing & Frequency	REPORTING Under EPA Act DWER
further than 10 m.	which do not contribute to the exceedance. Implement the management and/or contingency actions within seven days of the exceedances being reported and continue implementation of those actions until the CEO has confirmed by notice in writing that it has been demonstrated that the threshold criteria are being met and implementation of the management and/or contingency actions are no longer required Investigate to provide information for the CEO to determine potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded.		• investigate to provide information for the CEO to determine potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded as per Condition 8-5(4) • The OWNER shall provide a further report to the CEO within 21 days of the exceedance being reported as required by condition 8-5(1). Exceedance reporting as per Section 2.4.4.
Surface Water Quality			

ENVIRONMENTAL CRITERIA Trigger Criteria Threshold Criteria	RESPONSE ACTIONS Trigger Level Actions Threshold Contingency Actions	MONITORING Monitoring Indicators, Methods and Locations Timing & Frequency	REPORTING Under EPA Act DWER
Trigger Criterion 2: Exceedance of Surface Water quality trigger levels (refer to Table 1-4).	**Trigger Response 2:** Confirm validity of result (i.e., review sampling procedures, review dataset, review baseline data). Review results from nearby monitoring locations, where available. Investigate if the cause of change is due to construction or operation of the Project using appropriate trends/statistical analyses. If results are assessed to be likely due to the construction or operation of the Project, the exceedance is considered to be project-attributable, and the trigger criteria are considered to have been exceeded. Identify and implement relevant alternative activities which do not contribute to the exceedance.	**Indicator** Water quality parameters at each surface water monitoring location. **Method** Refer to Section 2.3 Resample affected monitoring location as soon as practicable and review the result no later than one week following resampling. **Locations** Refer to Section 2.3 **Timing & Frequency** Refer to Section 2.3.	**Trigger Reporting 2:** Monthly environmental reports as per Section 2.4.1. Document the trigger exceedance for later inclusion into the Environmental Performance Report and the annual Compliance Assessment Report (refer to section 2.4.2 and 2.4.3.)

ENVIRONMENTAL CRITERIA Trigger Criteria Threshold Criteria	RESPONSE ACTIONS Trigger Level Actions Threshold Contingency Actions	MONITORING Monitoring Indicators, Methods and Locations Timing & Frequency	REPORTING Under EPA Act DWER
Threshold Criterion 2: Exceedance of Surface Water quality threshold levels (refer to Table 1-4).	**Threshold Contingency Actions 2:** Confirm validity of result (i.e., review sampling procedures, review dataset, review baseline data). Review results from nearby monitoring locations, where available. If results are assessed as likely to be due to construction or operation of the Project, resample affected monitoring location as soon as possible (within one day) to verify the result. Where construction or operation of the proposal are found to contribute to the exceedance, halt relevant activities. Remediate, where necessary. Identify additional measures required to prevent the threshold level being exceeded in the future (refer to Section 3 adaptive management) Implement the management and/or contingency actions within seven days of the exceedances being reported and continue implementation of those actions until the CEO has confirmed by notice in writing that it has been demonstrated that the threshold criteria are being met and implementation of the management and/or contingency actions are no longer required. Investigate to provide information for the CEO to determine potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded	**Indicator, Location, Timing and Frequency** Continue monitoring including effectiveness of remediation to determine potential environmental harm or alteration of the environment.	**Threshold Reporting 2:** Where threshold criteria is exceeded: • The OWNER shall report the exceedance in writing to the CEO within seven days of the exceedance being identified as per Condition 8-5(1) • investigate to provide information for the CEO to determine potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded as per Condition 8-5(4) • The OWNER shall provide a further report to the CEO within 21 days of the exceedance being reported as required by condition 8-5(1). Exceedance reporting as per Section 2.4.4.
Groundwater Quality			

ENVIRONMENTAL CRITERIA Trigger Criteria Threshold Criteria	RESPONSE ACTIONS Trigger Level Actions Threshold Contingency Actions	MONITORING Monitoring Indicators, Methods and Locations Timing & Frequency	REPORTING Under EPA Act DWER
Trigger Criterion 3 Exceedance of groundwater quality trigger levels. **Physical Parameters (including major ions, pH, EC and ORP)** Major ions = Significant change (i.e., +/-25%) from baseline chemistry. pH = 1 pH unit decrease. EC = 20% change under same tidal conditions. ORP = Change from oxidising to reducing or vice versa. **Total Recoverable Hydrocarbons (TRH)** Baseline value (where detected) +10%. Where Baseline value is <LOR, trigger is equal to LOR. **Benzene, Toluene, Ethylbenzene and Xylene (BTEX)** Where Baseline value is <LOR, trigger is equal to LOR. **Nutrients (Ammonia, Total Nitrogen, Nitrite, Nitrate and Total Kjeldahl Nitrogen)**	**Trigger Response 3:** Confirm validity of result (i.e., review sampling procedures, review baseline data, review dataset). Review results from nearby monitoring locations, where available. Increase the monitoring frequency to assess trends or whether increase / exceedance is persistent. Investigate if the cause of change is due to construction or operation of the Project using appropriate trends/statistical analyses. If results are assessed to be likely due to the construction or operation of the Project, the exceedance is considered to be project-attributable, and the trigger criteria are considered to have been exceeded. Such investigations may include confirmation of the integrity of site storage facilities, identification of plant failures and or spills and assessment of general housekeeping. Once actions to address the identified exceedance(s) have been implemented, the OWNER shall monitor the effectiveness of the actions and shall continue until such time as they are advised by the CEO to cease. **For Project Attributable exceedances of trigger criteria:** Resample affected monitoring location as soon as practicable and review the result no later than one week following resampling. If both rounds of monitoring show trigger levels have been exceeded, increase frequency of monitoring in order to further assess changes. Notify CEO within 7 days of become aware of the exceedance.	**Indicator** Water quality parameters at each groundwater monitoring location. **Method** Refer to Section 2.3 Resample affected monitoring location as soon as practicable and review the result no later than one week following resampling. **Locations** Refer to Section 2.3 **Timing & Frequency** Refer to Section 2.3.	**Trigger Reporting 3:** Monthly environmental reports as per Section 2.4.1. Document the trigger exceedance for later inclusion into the Environmental Performance Report and the annual Compliance Assessment Report (refer to section 2.4.2 and 2.4.3.)

ENVIRONMENTAL CRITERIA Trigger Criteria Threshold Criteria	RESPONSE ACTIONS Trigger Level Actions Threshold Contingency Actions	MONITORING Monitoring Indicators, Methods and Locations Timing & Frequency	REPORTING Under EPA Act DWER
Baseline value (where detected) +10%. Where Baseline value is <LOR, trigger is equal to LOR. **Metals (Total Iron, Total Aluminium, Arsenic, Cadmium, Cobalt, Copper, Lead, Chromium, Nickel, Selenium and Zinc)** Baseline value (where detected) +10%. Where Baseline value is <LOR, trigger is equal to LOR.	Identify and implement relevant alternative activities which do not contribute to the exceedance. Identify and implement relevant alternative activities or additional measures to prevent exceedance and which do not contribute to the exceedance. Provide report within 21 days to CEO.		
Threshold Criterion 3 Exceedance of groundwater quality threshold levels. **Physical Parameters (including major ions, pH, EC and ORP)** Major ions = +/-30% from baseline chemistry pH = <4.5 EC = 30% change under same tidal conditions ORP = Change from oxidising to reducing or vice versa. **Total Recoverable Hydrocarbons (TRH)** Maximum concentration + Standard Deviation. **Benzene, Toluene, Ethylbenzene and Xylene**	**Threshold Contingency Actions 3:** Confirm validity of result (i.e., review sampling procedures, review dataset, review baseline data). Review results from nearby monitoring locations, where available. If results are assessed as likely to be due to construction or operation of the Project, resample affected monitoring location as soon as possible (within one day) to verify the result. Where construction or operation of the Project are found to contribute to the exceedance, halt relevant activities. Remediate, where necessary. Identify additional measures required to prevent the threshold level being exceeded in the future (refer to Section 3 adaptive management) Implement the management and/or contingency actions within seven days of the exceedances being reported and continue implementation of those actions until the CEO has confirmed by notice in writing that it has been demonstrated that the threshold criteria are being met and implementation	**Indicator, Location, Timing and Frequency** Continue monitoring including effectiveness of remediation to determine potential environmental harm or alteration of the environment.	**Threshold Reporting 3:** Where threshold criteria is exceeded: • The OWNER shall report the exceedance in writing to the CEO within seven days of the exceedance being identified as per Condition 8-5(1) • investigate to provide information for the CEO to determine potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded as per Condition 8-5(4) • The OWNER shall provide a further report to the CEO within 21 days of the exceedance being reported as required by condition 8-5(1).

ENVIRONMENTAL CRITERIA Trigger Criteria Threshold Criteria	RESPONSE ACTIONS Trigger Level Actions Threshold Contingency Actions	MONITORING Monitoring Indicators, Methods and Locations Timing & Frequency	REPORTING Under EPA Act DWER
(BTEX) Exceedance relative to designated environmental criteria (Marine Water LOSP 95%). **Nutrients (Ammonia, Total Nitrogen, Nitrite, Nitrate and Total Kjeldahl Nitrogen)** Maximum concentration + Standard Deviation. **Metals (Total Iron, Total Aluminium, Arsenic, Cadmium, Cobalt, Copper, Lead, Chromium, Nickel, Selenium and Zinc)** Maximum concentration + Standard Deviation	of the management and/or contingency actions are no longer required. Investigate to provide information for the CEO to determine potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded.		Exceedance reporting as per Section 2.4.4.
Groundwater Levels			
Trigger Criterion 4 Continuous increasing trend and/or continuous decreasing trend in the Depth to groundwater (mBTOC and mAHD).	**Trigger Response 4:** Confirm validity of result (i.e., review sampling procedures, review dataset, review baseline data). Review results from nearby monitoring locations, where available. Investigate if the cause of change is due to construction or operation of the Project using appropriate trends/statistical analyses. If results are assessed to be likely due to the construction or operation of the Project, the exceedance is considered to be project-attributable, and the trigger criteria are considered to have been exceeded. Identify and implement relevant alternative activities which do not contribute to the exceedance.	**Indicator** Groundwater level changes at groundwater monitoring locations during quarterly monitoring events . **Method** Refer to Section 2.3.3 Resample affected monitoring location as soon as practicable and review the result no later than one week following resampling. **Locations** Refer to Section 2.3.3 and Figure 2-2	**Trigger Reporting 4:** Monthly environmental reports as per Section 2.4.1. Document the trigger exceedance for later inclusion into the Environmental Performance Report and the annual Compliance Assessment Report (refer to section 2.4.2 and 2.4.3.)

ENVIRONMENTAL CRITERIA Trigger Criteria Threshold Criteria	RESPONSE ACTIONS Trigger Level Actions Threshold Contingency Actions	MONITORING Monitoring Indicators, Methods and Locations Timing & Frequency	REPORTING Under EPA Act DWER
	For Project Attributable exceedances of trigger criteria: Undertake additional gauging round as soon as practicable following implementation of contingency actions and review the result. If both rounds of monitoring show trigger levels have been exceeded increase frequency of monitoring in order to further assess changes. Notify the CEO within 7 days of becoming aware of the exceedance. Identify additional measures required to prevent the trigger level being exceeded and implement as required. Provide report within 21 days to CEO.	**Timing & Frequency** Refer to Section 2.3.3	
Threshold Criterion 4 Continuous increasing/decreasing trend of >12 months.	**Threshold Contingency Actions 4:** Confirm validity of result (i.e., review sampling procedures, review dataset, review baseline data). Review results from nearby monitoring locations, where available. If results are assessed as likely to be due to construction or operation of the Project, resample affected monitoring location as soon as possible (within one day) to verify the result. Where construction or operation of the Project are found to contribute to the exceedance, halt relevant activities. Remediate, where necessary. Identify additional measures required to prevent the threshold level being exceeded in the future (refer to Section 3 adaptive management) Implement the management and/or contingency actions within seven days of the exceedances being reported and continue implementation of those actions until the CEO has confirmed by notice in	**Indicator, Location, Timing and Frequency** Continue monitoring including effectiveness of remediation to determine potential environmental harm or alteration of the environment.	**Threshold Reporting 4:** Where threshold criteria is exceeded: • The OWNER shall report the exceedance in writing to the CEO within seven days of the exceedance being identified as per Condition 8-5(1) • investigate to provide information for the CEO to determine potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded as per Condition 8-5(4) • The OWNER shall provide a further report to the CEO within 21 days of the exceedance being reported as

ENVIRONMENTAL CRITERIA Trigger Criteria Threshold Criteria	RESPONSE ACTIONS Trigger Level Actions Threshold Contingency Actions	MONITORING Monitoring Indicators, Methods and Locations Timing & Frequency	REPORTING Under EPA Act DWER
	writing that it has been demonstrated that the threshold criteria are being met and implementation of the management and/or contingency actions are no longer required. Investigate to provide information for the CEO to determine potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded.		required by condition 8-5(1). Exceedance reporting as per Section 2.4.4

2.2 Objective based Provisions

An objective-based provision is the Project-specific desired state for an environmental factor to be achieved from the implementation of management actions and must relate to the EPA's environmental objective for a particular factor.

This Section of the SWMP provides details of the objective based provisions to be implemented for the Project. Objective-based provisions relate to management actions and are used where it is not practical, efficient or necessary to implement outcome-based provisions because the priority for protection is lower. Management actions are the actions implemented to achieve the environmental objective which generally relate to the 'minimise' and 'rehabilitate' steps of the mitigation hierarchy, while management targets are a type of indicator defined to demonstrate that the objective is being met.

The surface water management performance objectives of the Project are to prevent the unmanaged discharge of surface and process waters to the surrounding environment.

This will be achieved through:

- Minimising ground disturbance and implementation of progressive erosion and sediment controls;
- Construction of adequately sized onsite retention basins;
- Controlled release of water from the site after water quality testing;
- Preventing leaks or spills of chemicals and other contaminants (oily water) from entering surface water and groundwater;
- Treating contaminated water for reuse or approved disposal;
- Timely rehabilitation of disturbed areas;
- Resurfacing with stored topsoil; and
- Revegetation of the disturbed areas as soon as practicable.

The Project has included management targets and management actions that will aid the Project in achieving the objectives stated within Condition 6-1 and 8-1 of MS 1180 as well as the overall EPA objective for Inland Waters and these are outlined in Table 2-2 below.

Table 2-2 Surface Water Objective-Based Conditions (Management Actions, Targets and Monitoring)

EPA Factors and Objectives	**Inland Waters** - To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.
Objective from MS 1180	**Condition 8-1** - Maintain the hydrological regimes and quality of surface water so that environmental values are protected. **Condition 6-1 -** Minimise Project attributable impacts on groundwater quality, flow direction and/or depth to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.
Key Environmental Values	Fresh water quality maintaining the health of surrounding ecosystems and supporting fauna which utilise these ecosystems. Natural drainage channels and temporary watercourses supporting local vegetation and habitat values for conservation significant fauna. Natural microbial presence, composition and distribution in soil layers. Natural species richness and composition of seeds within topsoil/subsoil. Natural chemistry and composition of topsoil/subsoil from leaf litter and natural sources of decomposed organic matter.
Key Impacts and Risks	Degradation of hydrological regimes and quality of surface water.

Management Actions	Management Targets	Monitoring	Reporting
Management Actions 1 – Hydrological Management ▪ Establish sediment, erosion and water quality control measures including silt fences, clean and dirty water diversions, sediment basins and stockpile areas down gradient of areas. ▪ Where possible, diverted water is to be discharged into remnant sections of natural water courses downstream of the Project work area. ▪ Existing drainage lines will be protected, and any diversion of these lines should be kept to a minimum. ▪ Flow management across the site will prevent the concentration and diversion of waters onto steep or erosion prone slopes. ▪ Any diversion of drainage lines will be directed to slopes that are not prone to erosion. ▪ Disturbance to watercourses, riparian vegetation and flood plains will be avoided or minimised, wherever practicable, and managed in accordance with this SWMP. ▪ Where possible, existing vegetation surrounding the construction site will be used as a buffer zone to help filter surface runoff and should not be disturbed unless necessary for the purpose of construction. ▪ Any disturbance of watercourses should be completed during dry, non-flow periods. ▪ Natural surface water channels will be reinstated wherever possible following disturbanceto a watercourse. ▪ Establish access routes for site vehicles and deliveries to minimise disturbance of cleared areas.	**SWMT 1** Maintain the natural landscape and surface water flows as much as practicable.	**Indicator** Variation from natural watercourse conditions (can include direct disturbance to watercourses during construction, or indirectly from erosion causing accumulation of sediments downstream, impacting surface water flows.) **Method** GPS data of the natural site hydrology (landscape depressions) will be compared to the changing state during clearing and construction. Inspections of the effectiveness of surface water diversions during first rains and heavy rainfall events. **Location** Project site (natural site hydrology) surface water channels and diversions. **Timing & Frequency** *During Construction and Operation (Life of Project)* Weekly environmental inspections. Water diversions inspected during first rains.	Compliance with **SWM Target 1** will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA. All clearing/disturbance that does not follow the conditions on the Ground Disturbance Permit (GDP) will be required to be reported as an incident in Perdaman's incident management system. Exceedance reporting as per Section 2.4.4 if discharged water does not comply with DWER guidelines. A log of water used for dust suppression will be maintained and reported in the Monthly Environmental Report. Information reported will include, where relevant, the source of the water (e.g.: bore reference number or standpipe reference), date and time, volume removed (including meter reading at start and finish), location where water was used.

Management Actions	Management Targets	Monitoring	Reporting
▪ Diversion channels will be constructed with similar gradients to the natural surface water systems in the Project area. ▪ Stabilisation of the banks of any open diversion channels is to be undertaken with direct seeding of native vegetation species endemic to water courses in the region, or through use of weed free, excess topsoil from a similar area previously cleared from the Project site.			
Management Action 2 – Groundwater Baseline ▪ Establish baseline condition of the groundwater environment and quality and to determine treatment requirements (if any). ▪ Undertake more than one monitoring event to ensure the data are representative and to capture seasonal variations. ▪ The laboratory analytical suite of samples taken through boreholes should include: pH, total acidity, total alkalinity, sulfate, chloride, sodium, ammonia (as nitrogen), total dissolved solids (TDS), EC, total nitrogen, total phosphorus, dissolved aluminium (filtered), total aluminium, dissolved arsenic (filtered), dissolved chromium (filtered), dissolved cadmium (filtered), total iron, dissolved iron (filtered, dissolved manganese (filtered, dissolved nickel (filtered), dissolved selenium (filtered) and dissolved zinc (filtered). Measurements of pH, redox potential (Eh), dissolved oxygen (DO), total titratable acidity, total titratable alkalinity and conductivity should be made in the field. DER recommends low-flow sampling methods over the use of	**SWMT 2** Conduct baseline ground and surface water investigations to determine baseline water quality and the local hydrological regimes.	**Indicator** Baseline ground and surface water quality as indicated by the Coffey 2022b Report (Appendix E of **Attachment I**). **Method** Engage specialist to carry out baseline groundwater assessment at least six months prior to ground disturbance. Review baseline data to develop a monitoring program including sampling frequencies, locations and analytes. **Locations** Groundwater monitoring bores (refer to **Appendix E**). **Timing & Frequency** *Prior to Construction commencing* Baseline from February 2022 compared against ongoing monitoring on a quarterly basis.	Hydrogeological Assessment will be provided to the CEO in accordance with 6-2 of MS 1180. Compliance with **SWM Target 2** will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA Where changes in groundwater quality exceeds baseline water quality, reporting of exceedances will be implemented as per Section 2.4.4.

Management Actions	Management Targets	Monitoring	Reporting
bailers for sampling groundwater.			
Management Actions 3 – Surface Water Quality ▪ Undertake quarterly monitoring of surface waters and compare against baseline results. ▪ Implement the surface water monitoring program (Section 2.3.2) throughout construction and operation of the Project to ensure there are no adverse impacts attributable to Project activities to surface water quality, including indications of excess nutrients, hydrocarbons, and ASS indications (i.e. Aluminium etc) and other COPC, identified in samples taken. ▪ Water will be treated to ensure discharge from hold ponds is clean and consistent with naturally occurring water quality from nearby creeks or surface runoff (compare monitoring results against baseline). ▪ Hold pond water to be treated and tested to ensure compliance with water quality requirements prior to discharge. ▪ Measure physicochemical water quality at the surface water locations and collect samples, if surface water is present. Note observations if no surface water is present at the time of survey.	**SWMT 3** During and after works, the physical parameters of surface water are not to significantly vary or fall below the values that exist onsite, prior to the works commencing.	**Indicator** Surface water quality in alignment with DWER guidelines prior to discharge or reuse (see Table 2-3 2.3.2). Surface water baseline results. **Method** Monitor water quality as per the provisions and method provided in Table 2-3. Compare against baseline surface water quality as indicated by the Coffey 2022b Report (Appendix E of **Attachment I**) and compare results against the nominated ANZECC guidelines. **Location** Surface water monitoring locations as indicated by Figure 2-1 **Timing and Frequency** *During Construction and Operation (Life of Project)* Baseline from February 2022 compared against ongoing monitoring on a quarterly basis.	Compliance with **SWM Target 3** will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA. Exceedance reporting as per Section 2.4.4 if surface water quality does not meet DWER guidelines (Table 2-6 and Table 2-7). Unauthorised discharge into the environment will be reported. Report observations made at time of survey if no surface water is present to monitor.
Management Action 4 – Groundwater Monitoring ▪ Establish a ground water monitoring program to determine groundwater quality impacts from project attributable activities during construction and operations. ▪ Monitor the groundwater quality parameters provided in Table 2-8 to identify any exceedances to corresponding triggers and thresholds	**SWMT 4** During and after works, the physical parameters of groundwater are not to significantly vary or fall below the values that exist onsite, prior to the works commencing. Groundwater levels shall not be adversely impacted due to project attributable activities (i.e. a pattern of groundwater decline, due to changes in surface water flows from construction or	**Indicator** Groundwater quality (parameters from *Table 2-8 Proposed Groundwater Monitoring Schedule* (Coffey, 2022b) Triggers and thresholds (Table 2-8) in relation to baseline results (Appendix E of **Attachment I**).	Compliance with **SWM Target 4** will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA. Where changes in groundwater quality exceeds baseline water quality, reporting of exceedances will be implemented as per Section 2.4.4. The results of any field testing in ASS or PASS areas will be provided to the

Management Actions	Management Targets	Monitoring	Reporting
also provided in the proposed monitoring schedule (Table 2-8). ▪ Assess the current and latest monitoring event data with the baseline data to determine groundwater quality and potential indicators (trigger and threshold exceedances) that construction or operations are impacting groundwater environment adversely. ▪ Collect groundwater samples using a passive sampling device or other industry accepted method deemed suitable for groundwater monitoring purposes. Parameters to be monitored are included within Section 2.3.2 of this Plan.	operational activities).	**Method** Monitor depth to groundwater and the following quality parameters (mBTOC and mAHD), pH, redox (Eh), electrical conductivity (EC), Total Titratable Acidity (TTA) and Total Alkalinity (Talk), Oxidation Reduction Potential (ORP), Total Recoverable Hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene (BTEX), ammonia (NH_3), total nitrogen (TN), nitrate (NO_3^-), nitrite (NO_2^-), total kjeldahl nitrogen (TKN), total iron (TFe), total aluminium (TAl), arsenic (As), cadmium (Cd), cobalt (Co), copper (Cu), lead (Pb), chromium (Cr), manganese (Mn), mercury (Hg), nickel (Ni), selenium (Se), and zinc (Zn) through groundwater bores to detect possible leaching. Water sampling should be undertaken in accordance with the relevant guidelines and standard operating procedures. EPC shall sample and monitor all groundwater bores at least **every six (6) months** and compare the results against the baseline groundwater quality, groundwater flow directions, and depth to groundwater obtained from the hydrogeological studies referred to in Condition **6-2.** **Locations** Groundwater monitoring bores (see Figure 2-2). **Timing & Frequency** *During Construction and Operation (Life of Project)* Monthly in construction zones. Quarterly in all other areas (March, June,	HSSE Manager immediately on their receipt and prior to the commencement of ground disturbing activities. In the event that monitoring indicates an exceedance of threshold levels, EPC shall report findings to Perdaman, who will report findings to the **CEO** within seven days of the exceedance being identified.

Management Actions	Management Targets	Monitoring	Reporting
		September and December). Ongoing subsequent monitoring to occur quarterly. Weekly Inspections	
Management Actions 5 – Pollution Control & Prevention ▪ All surface water discharges on site shall be diverted to a purpose-built facility to treat (if required) and be contained by implementing the following actions: ▪ External water flows entering the Project's battery limits will be diverted around the construction footprint, using drainage structures such as catch drains and bunds. ▪ All drainage lines likely to receive run-off from disturbed areas, such as those downstream of worksites, will be fitted with geotextile silt fences. Rock checks should also be used in drains to slow flows and provide a lining to prevent scouring of underlying surfaces. ▪ Sediment basins will be added to drainage lines as necessary. Basins shall be designed relative to the catchment and likely flow levels for higher rainfall events. For water containing very fine sediment a longer detention period may be necessary to prevent turbid discharge. ▪ All stormwater proposed for discharge will first be contained in an appropriately lined sediment or attenuation basin, to encourage sediment to settle out. ▪ Where possible, stormwater will be captured and used for construction activities and will be treated to meet regulatory discharge requirements before it leaves the Project boundary. Potentially contaminated stormwater (e.g. runoff which contains hydrocarbons) will not be discharged into the environment.	**SWMT 5** **Pollution** caused by site activities will be **avoided** through appropriate containment, diversion and treatment of surface water run-off.	**Indicator** Stormwater (fresh and contaminated) run-off collection systems are effective. Signs of stormwater not being captured. **Method** Conduct inspections of stormwater drainage, storage and sediment control structures to ensure hydraulic integrity and effectiveness. Water quality will be monitored to ensure compliance with standards prior to discharge. Monitoring water quality as per the Monitoring Provisions in Table 2-3. Monitoring for potential trace elements surrounding identified areas of sedimentation (to ensure accidental discharge has not occurred). Monitoring of vegetation health. **Location** Stormwater drainage channels (both natural and made diversions), hold ponds and surface water processing systems. **Timing & Frequency** *During Construction and Operation (Life of Project)* Weekly inspections of stormwater drainage and control structures.	Compliance with **SWM Target** 5 will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA. Unauthorised discharge into the environment will be reported Where spills leach offsite or impact surrounding environmental values, reporting of exceedances will be implemented as per Section 2.4.4 Damages to pollution control structures will be reported as incidents.

Management Actions	Management Targets	Monitoring	Reporting
▪ Storm water collected from construction areas that is considered not to be at risk from hydrocarbon contamination will be kept separate from natural surface water and reused on site or discharged via sediment reduction controls. ▪ Run-off collected from hardstand surfaces, conveyor and product storage sheds in the production plant and the port areas will be managed to minimise impacts on surrounding environments, including marine environmental quality. During operation of the Urea Plant: ▪ Use granular urea instead of prilled urea to minimise fines and dust production which may accidentally be discharged during conveying and ship-loading activities. ▪ Revegetate and rehabilitate areas no longer in use and implement landscaping where possible around site facilities to act as a filter for potential offsite contamination. (Specific Post Construction Management Action and Targets associated with emissions will be addressed in the EPA Part V Works Approval and Operating License for the facility).			
Management Actions 6 – Erosion & Sedimentation Sediment controls are designed to prevent the transportation of sediment and other pollutants from worksites to waterways. They will be installed across the Project sites in areas where land is disturbed, and any identified damage to structures is to be repaired immediately upon discovery. To minimise the land exposure and potential risk of erosion, all land disturbances should be confined to a minimum practical working area and	**SWMT 6** Erosion and sedimentation caused by site activities will be minimised through appropriate containment and diversion of surface water run-off.	**Indicator /s** Unnatural erosion and deposition of sediments. Stormwater not captured within structures as designed. Evidence of stormwater impacting natural landforms (i.e., exposed vegetation roots, poor drainage etc). **Method** Review of Erosion and Sediment Control Plans and validate that the proposed	Compliance with **SWM Target 6** will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA. If containment capacities are exceeded, report any exceedances as per Section 2.4.4. Damages to sediment control structures will be reported as incidents.

Management Actions	Management Targets	Monitoring	Reporting
within the vicinity of the identified work areas. Sediment controls will include the following: ▪ Sedimentation controls will be constructed prior to the clearing of any large areas at risk of generating runoff. ▪ Ensure that silt from batters, cut-off drains, table drains, and road works is retained on site and replaced as soon as practicable, sediment controls will be installed downstream of any disturbed land such as worksites, prior to that work being undertaken. ▪ Sediment control structures at waterway crossings will be developed during the detailed design process before any such work takes place. ▪ If any areas of localised erosion develop, they will be remediated as soon as practicable to prevent further erosion or sediment deposition in offsite areas. ▪ Temporary drainage structures will be designed to reduce run-off velocities by using wider inverts, flat bottomed drains rather than V-shaped drains, check dams (or similar), silt fencing and revegetation of completed areas. ▪ Rock armouring and other erosion controls will be utilised in areas of high erosion potential (e.g.: steep gradients and bends). ▪ Cleaning of all drains to remove silt, vegetation (where capacity is reduced) and litter. ▪ Site specific erosion measures will be detailed in an Erosion and Sediment Control Plan developed for each site within the PDE. Run-off controls will be developed and maintained to the following standards: ▪ Controls will be designed to take predicted flows, based on 140436-000-		erosion and sediment controls have been implemented and, where relevant, revised to accommodate the changing environment. Inspections to observe and record any scouring, erosion and sediment transfer particularly beyond the Project footprint. Monitor the sediment basin depth pegs through weekly inspections. Regularly inspect stormwater drainage and sediment control structures to ensure hydraulic and structural integrity and erosion and pollution control effectiveness. Weekly inspection of access roads and hardstand areas to identify erosion damage in need of maintenance. Remediation is to occur within one month or earlier if heavy rains are likely. Weekly inspections of general soil integrity, vegetation health and evidence of poor drainage, soil compaction, etc. GPS data of the natural site landscape depressions will be compared to the changing state to help infer potential deposition and erosion on site. **Locations** Sediment basins, areas with a corresponding ESCP (erosion and sediment control plan), all sediment control structures, stockpiles. **Timing & Frequency** *During Construction* Weekly erosion inspections. Weekly stormwater and sediment control structure inspections. Monthly GPS checks to identify erosion	

Management Actions	Management Targets	Monitoring	Reporting
41EG-0001 Standard Specification Geographic, Climatic and Wind / Seismic Data. ▪ Exposed ground will have control measures that minimise the level of erosion. ▪ Drains will be installed across the site to divert clean surface water to stable areas and away from parts of the site where soil is exposed. ▪ Installation of sediment traps and basins with a riser pipe or flexible pipe and spillway to avoid adverse flood risk to adjoining properties. These systems shall allow for the gradual discharge of the clearest water during a storm event. ▪ If the control structures are obstructed or have their capacity reduced by 30% or more through the accumulation of silt, litter, vegetation and other debris, they shall be cleared, with silt returned to a stabilised part of the Project. ▪ Geotextile silt fences shall be installed in surface water flow areas to minimise the sediment discharge from the site (see Attachment B). ▪ Where silt fences are installed for sediment control, they must be constructed with a centre section lower than the ground levels at the end of the silt fence to avoid outflanking during heavy rainfall events. ▪ Silt and sediment fences will be installed and maintained until the areas up-gradient have been adequately stabilised to minimise the erosion risk such that the controls can be removed. ▪ Should hay bales be used for sediment control, they will be made of straw sourced from cereal crops and be free of weed seeds.		and deposition.	

Management Actions	Management Targets	Monitoring	Reporting
Management Actions 7 – Climate & Flood Risk ▪ Construction activities will be scheduled to avoid periods of heavy rainfall, strong winds or peak water flow. ▪ Hold ponds will be designed to withstand the containment capacity of a 1 in 100-year storm event. ▪ Any disturbance of watercourses should be completed during dry, non-flow periods. ▪ Clearing of sloping ground is to be managed, where possible, to avoid wet periods, to minimise erosion of unstable ground. ▪ Stabilisation of disturbed areas and new surface water lines will be completed prior to the wet season. ▪ As far as practicable, works in water ways will be conducted during the dry season to minimise environmental impacts. ▪ Basins shall be designed relative to the catchment and likely flow levels for higher rainfall events. ▪ The following criteria are applicable to the design of stormwater infrastructure with respect to Stormwater Quantity (Flooding): ▪ Designed in accordance with the 'Major/Minor' approach outlined in Australian Rainfall and Runoff and AUSTROADS Waterway Design Guidelines ▪ Adopt the guidance from DWER Water Quality Protection Note 52: Stormwater Management atIndustrial Sites ▪ Minimise the impact of flooding on structures and as a general principal, for storms of 1 in 20-year ARI or less, the post-development flows should meet pre-	**SWMT 7** Schedule site activities in consideration of local climate and incoming weather events. Construct Erosion Sediment Pollution Controls (ESPCs) in consideration of climatic conditions to prevent flooding within and adjacent to the PDE.	**Indicator** Evidence on site, at hold ponds, ESPC infrastructure and stormwater containment of flooding events or other extreme weather events affecting the integrity or effectiveness. **Method** Monitoring of incoming weather and predicted climate. Monitor timing of works against a predetermined schedule to ensure adherence to best practice timeframe of works. Monitoring water quality as per the Monitoring Provisions Table 2-3. Weekly inspections of stormwater drainage, storage and sediment control structures to ensure effectiveness of the load capacity. **Location** Monitor flow velocities in natural or unlined channels during rains. Monitoring of the site rain gauge. Monitoring incoming weather through BOM or a local trusted meteorology platform. **Timing & Frequency** *During Construction* Weekly stormwater and sediment control inspections. Monitor incoming weather events daily. Flow velocities monitored during first rains and each precedingly more intense rain event thereafter.	Compliance with **SWM Target** 7 will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA.

Management Actions	Management Targets	Monitoring	Reporting
development flows off the Project site, ▪ With respect to environmental flows, to prevent erosion, scouring and sedimentation in natural or unlined channels velocities of frequent/regular storm flows (1 in 5-year ARI storms) should be limited to velocities of less than 0.8 m/sec ▪ Major storms of up to 1 in 100-year ARI storm and up to 24-hour duration should be stored and treated on the plant site and recycled, all storms of a greater duration will be released in a controlled fashion through spillways. ▪ Within the PPA the design and construction of stormwater/drainage infrastructure will be to MRWAStandards. ▪ With respect to Stormwater Quality follow the guidance and adopt the practices of the Stormwater Management Manual for Western Australia and Water Quality Protection Note 52: Storm Water Managementat Industrial Sites. ▪ On-site and off-site stormwater management will minimise the export of pollutants from the site and adopt the following stormwater quality improvement targets as compared to untreated stormwater: ▪ Eighty percent (80%) reduction in Total Suspended Solids ▪ Ninety (90%) reduction in Gross Pollutants ▪ As a guide, peak flows must be retained on-site to allow management of stormwater quantity and quality by treating the first flush. The first flush treatment systems should be designed to treat a volume equivalent to a 1 in 3-month event ARI. ▪ Reductions in contaminant concentrations (by example heavy			

Management Actions	Management Targets	Monitoring	Reporting
metals, pathogens, nutrients and hydrocarbons) are to be consistent with ANZECC and other pertinent guidelines for marine water quality.			
Management Actions 8 – Rehabilitation ▪ Where sedimentation occurs, the source of the sediment should be determined to identify likely erosion in up gradient areas. The sediment should be removed and deposited if possible as part of erosion controls. ▪ Where erosion is identified and requires rehabilitation, the impacted area shall be filled, compacted and contoured to merge with the surrounding landscape. ▪ Throughout construction, rehabilitation of disturbed areas will be progressively undertaken, or as soon as practicable, following completion of specific works. ▪ Train personnel in the identification of erosion and sedimentation.	**SWMT 8** Erosion and sediment deposition will be managed through rehabilitation and corrective actions as soon as practicable upon identification.	**Indicator** Unnatural erosion and deposition of sediments. **Method** Monitor for sedimentation to assist in identifying upgradient erosion. Monthly comparisons of GPS data from natural conditions to assist in possible detection of erosion and sedimentation. The effectiveness of rehabilitated areas will be assessed through weekly inspections. **Locations** Site GPS data, rehabilitated areas and all surface water diversions. **Timing & Frequency** *During Construction and Operation (Life of Project)* Monthly GPS comparisons. Weekly inspections.	Compliance with **SWM Target 8** will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA.
Management Actions 9 – Spill Management ▪ Accidental spills will be prevented where possible, and emergency response actions to remediate accidental spills will be enacted immediately upon discovery. ▪ Spill Contingency and Emergency Response Plans and Procedures will be developed and implemented to address environmental risks and potential impacts	**SWMT 9** All spills onsite will be reported and remediated upon discovery.	**Indicator** Evidence of spills of hydrocarbons and hazardous chemicals. **Method** Monitored via incident management system. If incidents are to occur in frequent succession; an audit will be carried out sooner than the prescribed schedule and management measures	Compliance with **SWM Target 9** will be reported in the CAR, as per section 2.4.3 and in alignment with the CAP. CAR submitted to EPA. All non-compliances by personnel in relation to their responsibilities regarding spill management will be reported as an incident in Perdaman's incident management system.

Management Actions	Management Targets	Monitoring	Reporting
specifically related to the operational phase. ▪ Spill kits are to be maintained and kept in areas designated for refuelling activities and storage areas for dangerous goods. ▪ Ensure spill response training is provided to personnel. ▪ Ensure proper bunding and storage (110% containment) is provided for fuels and chemicals during construction. ▪ Equipment servicing will take place in designated areas. Field servicing will be undertaken in a manner that facilitates containment of all hydrocarbons and chemicals ▪ Containment bunds around facilities such as vehicle servicing facilities, chemical / fuel storage areas and concrete batch plants will be designed to minimise flood water entry andbe inspected on a regular basis. ▪ Management of hydrocarbons and hazardous substances must be undertaken in accordance with the requirements of PCF-PD-EN-PEMP Project Environmental Management Plan (PEMP).		will be amended. Spill response kits inspected weekly. Inspections of containment bunds and storage areas. **Locations** Chemical storage facilities designated refuelling areas and containment bunds. **Timing & Frequency** *During Construction and Operation (Life of Project)* Yearly audits (incident management system). Weekly inspections.	Spills will be reported as incidents. Where spills leach offsite or impact surrounding environmental values, reporting of exceedances will be implemented as per Section 2.4.4.
Management Actions 10 – Stormwater Ponds ▪ For paved areas of the urea processing plant, there will be stormwater collection pits (epoxy coated concrete pit) where the first 15mm of stormwater can be collected. Stormwater collected will be treated by steam stripping or other means to bring ammonia (Total Kjeldahl Nitrogen) in water within limit, prior to reuse within the process plant. ▪ The stormwater pond includes an oil skimmer for removal of oil traces. These are sent to the oily water collection	**SWMT 10** Stormwater ponds and collection pits will be managed / treated with relevance to their source of diversion, concerning potential contaminants contained within. Stored and treated water will be reused on site where applicable, and to the standards provided by DWER.	**Indicator** Stormwater diversion channel system **Method** Discharge from any oily water separator shall be monitored to ensure it contains less than 5ppm Total Recoverable Hydrocarbons (TRH) and is in compliance with Project approval conditions before it can be used for dust suppression or discharged into the environment. Water quality monitoring. Water quality will be monitored in the freshwater	Compliance with **SWM Target 10** will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA. Oily water separator test results will be reported to the HSSE Manager prior to releasing tested water to the environment.

Management Actions	Management Targets	Monitoring	Reporting
pit/processing. ▪ The Project's stormwater surface water system in the main process area (first flush) (Site C) will direct stormwater from hardstand areas into two separate streams which enable the containment and use of the runoff: ▪ Stormwater that could be contaminated by spills or leaks from process activities will be directed for pre-treatment, prior to being discharged by the MUBRL or evaporated in an evaporation pond; ▪ Uncontaminated stormwater will not be treated but will be pumped directly from the stormwater holding pond into the seawater used for cooling on site. ▪ In Site C uncontaminated stormwater runoff will be collected in a sediment basin and used for dust suppression and other construction needs. This measure will be implemented as part of the early works once the site's fill works have been completed. ▪ Where practicable, water reuse opportunities will also be sought in other project areas. ▪ Written approval from the Contractor's HSSE Manager must be obtained prior to reuse or discharge to the environment.		streams to determine if separation from potentially contaminated streams has been effective. **Locations** Oily water separator, oily water pond and all other hold ponds. **Timing & Frequency** *During Construction and Operation (Life of Project)* Weekly inspections.	
Management Actions 11 – Causeway Culverts ▪ The causeway will be built up above the flat and will include several hydrological and fauna friendly culverts to ensure the structure does not impede natural drainage or tidal action. ▪ Ensure causeway culvert flow velocities of less than 1.0 m/s to achieve the environmental outcomes of this design as per Condition 1 of MS 1180.	**SWMT 11** Maintain the quality and flow velocity of tidal water flow to the King Bay / Hearson Cove supratidal vegetation.	**Indicator** Tidal flow velocities across the causeway. **Method** Monitor culvert flow velocities using a flow probe to determine compliance with Condition 1 of MS 1180 (outflow velocities less than 1m/s). Monitor timing of works against a	Compliance with **SWM Target 11** will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA. Where exceedances of authorised limits of water flow velocities occur, reporting of exceedances will be implemented as per Section 2.4.4.

Management Actions	Management Targets	Monitoring	Reporting
▪ Causeway construction works will be completed over the shortest time practicable to minimise the period of environmental disturbance in the saline coastal flat. ▪ Prepare and Implement an Erosion and Sediment Control Plan (ESCP) for this area (prior to ground disturbance and in line with the GDP process and application).		predetermined schedule to ensure the shortest time practicable is adhered to regarding disturbance of the saline coastal flats. Monitor the health of vegetation of the supratidal flats. **Location** At the causeway culverts and vegetation of the supratidal flats. **Timing & Frequency** *During Construction and Operation (Life of Project)* Weekly environmental inspections.	
Management Actions 12 – Stockpile Management ▪ Stockpiles to be managed in accordance with Attachment A of the Project CEMP (Erosion, Sediment and Surface Water Management Protocol). ▪ Material Tracking System implemented during construction. ▪ Ensure ESCs are implemented around stockpiles to limit contaminated run-off. ▪ GPS utilised to track and record locations of stockpiles and type of material. ▪ Stockpile contaminated topsoil's (i.e. from weeds, ASS, spills) separately from clean fill or topsoil. ▪ Ensure Stockpiles are labelled / signposted. ▪ Training and awareness conducted onsite. ▪ Prepare stockpiles prior to rainfall or potential flood events. ▪ Stockpiles including overburden, clean fill and topsoil are to be established to minimise erosion and prevent movement	**SWMT 12** No incidents of contaminants / foreign materials (including ASS and PASS material if unexpectantly intercepted) causing pollution or sedimentation entering the surrounding environment via erosion / run-off directly from stockpiles.	**Indicator** Stockpile erosion and evidence of stockpile material or contaminant moving from stockpile. **Method** Ensure all relevant personnel have access to a Material Tracking System to easily identify contaminated stockpiles. Ensure all stockpiles are correctly bunded and inspect bunding regularly to ensure it is effective. Monitor for any weeds in the area surrounding stockpiles. Monitor stockpiles and location relevant to GPS locations in tracking system during auditing. **Locations** Stockpiles. **Timing & Frequency** *During Construction and Operation (Life*	Compliance with **SWM Target 12** will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA

Management Actions	Management Targets	Monitoring	Reporting
of material outside the stockpile footprint. ▪ Where excavation of PASS / ASS is carried out and subsequent treatment of ASS is required, a containment and treatment facility (treatment pad) will be developed onsite (See Management Action 19). Treatment, handling and management will be in accordance with Management Actions 19 and 20.		*of Project)* Weekly inspections. Monitoring via MTS. Monitoring during auditing.	

Management Actions	Management Targets	Monitoring	Reporting
Management Actions 13 – Erosion & Sediment Control Plans ▪ A Progressive Erosion and Sediment Control Plan (ESCP) will be developed for each project area and submitted for review and approval as part of the GDP process. The plan will consider the changes that will be required throughout the Project construction phase to ensure adequate management of surface water flows. As a minimum the ESCP shall include: > Site battery limits > Soil and general geotechnical description > Existing and planned contours including location of cut and fill banks > Existing and final overland flow drainage paths > Limits of clearing or land disturbance allowed for the proposed scope of works and or the broader Project > Location of vegetated buffer strips > Stabilised entry/exit point (rumble pad) > Location of soil and sand stockpiles > Location of all proposed temporary drainage control measures > Location of all proposed erosion control measures including installation sequence and maintenance requirements > Permanent site stabilisation measures The ESCPs will be developed and submitted as part of the GDP application process at least 2 weeks prior to commencing any work in the area being the subject of the GDP. Issuance of the GDP is subject to submission and approval of a suitable ESCP(s) for the	**SWMT 13** Develop Progressive Erosion and Sediment Pollution Control Plans for each site within the Project area.	**Indicator** Evidence of Project area without an ESCP. **Method** Site inspections to assess the effectiveness of all sediment, erosion and pollution controls will be undertaken and corrective actions implemented accordingly. MTS monitoring. Weekly inspections to ensure, where relevant, ESCP's are revised to accommodate the changing environment. Auditing of ESCPs on record and GDP's to ensure all work areas have a ESCP in place. **Locations** All locations with an ESCP in place. **Timing & Frequency** *Prior to Construction (and implemented during construction).* Weekly inspections.	Compliance with **SWM Target 13** will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA

Management Actions	Management Targets	Monitoring	Reporting
duration of works.			

Management Actions	Management Targets	Monitoring	Reporting
Management Action 14 – Ground Disturbance Permit Implement the GDP Procedure to ensure Project personnel are provided with a summary of the key approval commitments and legal obligations issued to Perdaman by regulators, tenure holders and other third parties when carrying out activities that include (but not limited to); clearing and grubbing, grading open ground, movement of plant, equipment and vehicles and any other activity which will disturb or damage soil, waterways, habitat and, or vegetation.	**SWMT 14** All ground disturbance activities within defined battery limits will have a GDP approved and contain ESPC plans for the work area / activity. All areas containing ASS and PASS material will be identified on site and avoided where possible.	**Indicator** Evidence of Project area without a GDP **Method** Auditing of GDPs to ensure all work areas have a GDP in place Surveyors to identify areas **Locations** All locations with an ESCP & GDP in place. **Timing & Frequency** *Throughout Construction* Weekly inspections.	Compliance with **SWM Target 14** will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA
Management Action 15 – Intrusive ASS Investigations ▪ EPC shall undertake intrusive acid sulfate soils investigations in accordance with the requirements of the Department of Water and Environmental Regulation's guideline (on behalf of Perdaman) on the Identification and investigation of acid sulfate soils and acidic landscapes (DWER 2015) at least six months prior to Ground Disturbing Activities as per Condition 7-1. ▪ ▪ Results from Tetra Tech Coffey (2022) report that ASS was identified but disturbance is unlikely based on design plans provided and limited to no cut and fill within high to moderate risk ASS areas at the Site. If ASS is disturbed during the implementation of the Project, the OWNER shall treat and manage ASS in accordance with the requirements of the (DER 2015).	**SWMT 15** EPC will carry out works in accordance with Conditions 7-1 and 7-2 of the MS 1180 for the Project.	**Indicator** ASS investigations are carried out in accordance with DWER 2015. Evidence of ASS material on site. **Method:** EPC engaged Coffey to conduct detailed site investigation for Acid Sulfate Soil, with results received in April 2022 to identify ASS/PASS at the locations being excavated. Monitoring to determine ASS presence Peer Review of ASS investigations. Review of ASS investigation findings against design and construction methodology. Mapping of ASS locations against excavations and cut and fill activities (refer to Appendix 3). **Locations:** All locations with ASS risk and proposed ground disturbance / construction to	Compliance with **SWM Target 15** will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA Reporting as per Section 2.4.5.

Management Actions	Management Targets	Monitoring	Reporting
		occur. Particularly within Site C and F and the causeway location. **Timing & Frequency:** *During Construction and Operation (Life of Project)* Visual ASS monitoring ongoing through life of the Project.	
Management Action 16 – Unexpected ASS Disturbance Where ASS are disturbed during the **implementation of the Project** the OWNER shall treat and manage ASS in Department of Water and *Environmental Regulation's guideline on the treatment and management of soil and water in acid sulfate soil landscapes* (DWER, 2015) and as required by the Acid Sulfate Soils Management Plan (PCF-PD-EN-ASSDMP) as per **Condition 7-2** (MS1180). The OWNER has prepared an Acid Sulfate Soils Management Plan (PCF-PD-EN-ASSDMP) due to the likely disturbance of ASS.	**SWMT 16** Implement design and construction methods that minimise and eliminate the potential disturbance of PASS/ASS. Implement an **unexpected finds procedure** for ASS. Comply with *Environmental Regulation's guideline on the treatment and management of soil and water in acid sulfate soil landscapes* (DWER, 2015) and as required by the Acid Sulfate Soils Management Plan (PCF-PD-EN-ASSDMP) and Condition 7-2 in the event ASS are disturbed during the Project. Comply with the Acid Sulfate Soils Management Plan (PCF-PD-EN-ASSDMP)	**Indicator:** Visual indication of PASS or ASS in surface water (i.e. crystal clear water, yellow brown water, iron flocs, blue-green water, milky white water). Visual indication of ASS being disturbed (i.e. acid scalds, iron monosulfides, jarosite). Confirmation (by laboratory analysis) of ASS or PASS material disturbed. **Method:** Determine possible presence of ASS or PASS through early warning indicators and ASS risk maps as provided by DWER's *Identification and investigation of acid sulfate soils and acidic landscapes,* and plan Works with regard to the possibility of ASS / PASS disturbance. Continual monitoring for evidence of ASS disturbance throughout construction excavation activities and operational activities for unexpected finds (Monitoring of groundwater and soils). Implement Groundwater and Surface Water monitoring programs. Monitor groundwater pH, redox (Eh), electrical conductivity (EC), Total Titratable Acidity (TTA) and Total Alkalinity (Talk) through groundwater	Compliance with **SWM Targets 16** will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA Reporting as per DWER 2015 Guidelines (where required). Environmental Performance Report

Management Actions	Management Targets	Monitoring	Reporting
		bores and compare to baseline results to detect possible ASS product leaching. If ASS are confirmed to be unexpectantly disturbed during construction activities, implement Management Actions 18, 19, 20, and 21 where applicable. **Location:** Areas under construction, particularly in ASS risk areas. Site C and F, and Causeway. Stockpiles and spoil locations. **Timing & Frequency:** *During Construction and Operation (Life of Project). Implementation of the Project* Throughout construction and upon identification of unexpected ASS disturbance. Throughout operations, where land is disturbed or excavated, or upon noticing the visual indicators.	
Management Action 17 – Staff Training and Awareness Train staff to detect and appropriately respond to ASS disturbance by recognising hydrogen sulfide gas by smell ('rotten-eggs'). Personnel will be trained in visual identification of ASS using practical workshops and made aware of risk areas. During visual inspections look for yellow, orange or brown mineral precipitates, or clay/peat like materials, and employ increased attention to soils from deeper horizons in the excavations.	**SWMT 17** Use knowledge of warning signs signalling ASS disturbance (in conjunction with monitoring efforts of SWMT 5a) to instigate implementation of the ASS treatment and management provided in this Plan.	**Indicator** Training and induction records **Method** Site personnel will continually monitor grounds for the presence of ASS by visual inspection (presence of orange/yellow plumes, clear surface run-off and iron / precipitate flocks) or indication by smell ('rotting-eggs' smell). **Locations** Project site. **Timing & Frequency** *During Construction and Operation (Life of Project)* Toolbox talks and during inductions	Reporting of ASS presence and disturbance as per Section 2.4.1 and 2.4.2. Updating of training / induction / competency registers.

Management Actions	Management Targets	Monitoring	Reporting
Management Action 18 –ASS Management (following identification) ▪ In the event ASS disturbance occurs onsite during the implementation of the Project: ▪ Submit samples exhibiting PASS/ASS indicators or from areas of concern to NATA laboratory for confirmatory SPOCAS/Scr analysis. In line with DWER guidance on presence of sandy PASS, a detection limit of 0.005%S will be adopted for the Project. ▪ Where PASS will be intersected, sample and develop a liming rate from the highest net acidity result in the vicinity of the excavation site using the liming rate calculation. ▪ Demarcate area to prevent cross contamination or miss-management of PASS/ASS material. ▪ In-situ treatment of excavation faces may include coating the exposed PASS horizons with granular neutralising agent or solution. ▪ No acid plumes are to be discharged offsite. The OWNER has prepared an Acid Sulfate Soils Management Plan (PCF-PD-EN-ASSDMP) due to the likely disturbance of ASS.	**SWMT 18** Compliance with DWER's *Identification and investigation of acid sulfate soils and acidic landscapes, Environmental Regulation's guideline on the treatment and management of soil and water in acid sulfate soil landscapes* (DWER, 2015) and as required by the Acid Sulfate Soils Management Plan (PCF-PD-EN-ASSDMP) as per **Condition 7-2** (MS1180) in the event of ASS disturbance. Delineation and documentation of all ASS which may be disturbed by site works. During and after works, the physical parameters, including pH of groundwater and surface water are not to significantly vary or fall below the baseline values (i.e. Coffey Report 2022b), prior to the works commencing and groundwater level is maintained above PASS during and after works. Comply with the Acid Sulfate Soils Management Plan (PCF-PD-EN-ASSDMP)	**Indicator** Improper storage, handling, management of ASS noticeable onsite during inspections, walkovers of construction and operational activities. **Method** Monitor areas where PASS/ASS material have been identified on site in addition to monitoring PASS/ASS stockpiles. Validation testing done to confirm presence of PASS/ASS material. Determine liming rate from the highest net acidity result sampled from the excavation. If disturbance of >1,000 tonnes of ASS occurs at the causeway or Site C then soil should be treated at the reported maximum Net Acidity of 0.39 %S. Based on the Net Acidity, a safety factor of 1.5 and an ENV of 91.5% (Aglime of Australia Product information Sheet, 2022) a calculated liming rate of 19.95 kg/tonne should be adopted for neutralisation of ASS. Monitor pH of PASS/ASS horizons. Monitoring of MTS.	Compliance with **SWM Target 18** will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA Reporting of exceedances for Groundwater and Surface Water in accordance with Threshold Criterion 2 and 3 (Table 2-1).
Management Action 19 – ASS Treatment, Reuse and Disposal **In the event ASS disturbance occurs onsite during the implementation of the Project:**	**SWMT 19** *Environmental Regulation's guideline on the treatment and management of soil and water in acid sulfate soil landscapes* (DER, 2015) and as required by the Acid Sulfate Soils Management Plan (PCF-PD-EN-	**Indicator** ASS pH / Net Acidity ASS volumes Soil validation in alignment with DER 2015. Chemical constituents associated with	Compliance with SWM Target 19 will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA Reporting of the volume of ASS / PASS material excavated.

Management Actions	Management Targets	Monitoring	Reporting
▪ Excavated materials that contain potentially acid-forming materials will not be reused for construction purposes unless approved prior to site mobilisation by the Environment and Heritage Manager. ▪ Reuse of treated soils is not to cause long-term impacts i.e. ensure the soils are geotechnically suitable, monitor for leach reaction products to the environment, will require capping and long-term management (not to be disturbed). ▪ Excavated materials that contain potentially acid-forming materials will be treated and disposed at an appropriate landfill. ▪ Treated ASS and PASS material not suitable for reuse on site is to be disposed of as soon as practicable to avoid further risks associated with stockpiling and storage. ▪ For all ASS neutralisation, soil validation sampling should be conducted in accordance with (DWER 2015) to ensure effective treatment and neutralisation of ASS. If soil validation sampling fails then soils should be retreated and re-validated until results show Net Acidity <0.03 %S. ▪ Following treatment of ASS soils, the target is to achieve 50% or more neutralising capacity than the sum of existing and potential acidity (i.e. confirmed by collection and analysis of verification samples). ▪ Determine locations where excess spoil requires ASS treatment and whether this will be disposed of on-site or removed from site and determine where this spoil will be treated and reused. ▪ All soils not suitable for reuse on site will	ASSDMP) as per **Condition 7-2** (MS1180) in the event ASS is disturbed. ASS material treated and reused on site must have a field soil pH of +/-0.5 when compared to field soil pH of naturally occurring background levels. pH is not to increase by 1 unit. Other potential contaminants, including but not limited to heavy metals, must be at a concentration no greater than 25% above or below the baseline levels established for the site (see Table 2-6). Comply with the Acid Sulfate Soils Management Plan (PCF-PD-EN-ASSDMP)	ASS (as per Table 2-8) Bund pad is to satisfy DER guidelines and a minimum thickness of 300 mm. **Method** Monitor volume of disturbed ASS removed for treatment. If disturbance of >1,000 tonnes of ASS occurs at the causeway or Site C then soil should be treated at the reported maximum Net Acidity of 0.39 %S. Based on the Net Acidity, a safety factor of 1.5 and an ENV of 91.5% (Aglime of Australia Product information Sheet, 2022) a calculated liming rate of 19.95 kg/tonne should be adopted for neutralisation of ASS. Soil validation sampling in accordance with DWER 2015. Monitoring of MTS.	Reporting of the volumes of treatment / neutralising agent used. MTS Recording.

Management Actions	Management Targets	Monitoring	Reporting
be transported in accordance with the *Environmental Protection (Controlled Waste) Regulations 2004* and disposed of at an appropriately licensed facility. **Treatment Pad Construction:** ▪ Construct suitably sized ASS treatment pad based on anticipated throughput requirements and verification testing turnaround times. ▪ Bund pad to comprise well-compacted alkaline material such as limestone (to minimise infiltration), minimum thickness of 300 mm to be maintained as per Department of Water and Environmental Regulation guidelines. **Transferring excavated material to treatment pad will include:** ▪ Place excavated ASS directly into a truck for carting to treatment pad. ▪ Stockpile material from different excavations separately and identify with signage. ▪ Ensure stockpiling method is consistent with Management Action 20. ▪ Complete daily material tracking sheets. **Neutralising ASS on treatment pad will include the following:** ▪ Blend excavated ASS stockpiles with an appropriate quantity of finely divided neutralising material (likely using an excavator fitted with a screening bucket). ▪ Record treatment rate and date on material tracking logs and signage. ▪ Collection of verification samples to confirm treatment has been effective. ▪ Treatment through a processing unit would include blending of lime with excavated soil and collection of verification samples to confirm treatment			

Management Actions	Management Targets	Monitoring	Reporting
has been effective. ▪ Verification may include: ▪ Collect representative composite samples of well-blended soil and neutralising agent to represent treatment batches. Rate of sampling to be as per *DER 2009 (Landfill Waste Classification and Waste Definitions 1996, as amended 2019).* ▪ Quality control duplicate samples to be collected. ▪ Samples to be analysed by a NATA accredited laboratory for pHKCl, pHf, and pHfox soil pH, and SPOCAS/Scr (i.e. acidity trail, and sulfur trail). ▪ Analysis for concentrations of metals (As, Al, Cd, Cr, Cu, Hg, Ni, Pb, Zn) if offsite disposal is required. ▪ Verification results will be tabulated and reviewed, for onsite use they will be verified for geotechnical suitability and for offsite use to assess classification for disposal. The OWNER has prepared an Acid Sulfate Soils Management Plan (PCF-PD-EN-ASSDMP) due to the likely disturbance of ASS.			
Management Action 20 – ASS Stockpiling / Containment Strategy **In the event of ASS disturbance the following stockpiling management techniques will be implemented.** ▪ Blend excavated ASS stockpiles with an appropriate quantity of finely divided neutralising material (likely using an excavator fitted with a screening bucket), as per *Environmental Regulation's guideline on the treatment and management of soil and water in acid sulfate soil landscapes* (DWER, 2015) and Management Action 19	**SWMT 20** Appropriately stockpile ASS and PASS materials in a manner which poses no risk of run-off, erosion or leaching into the environment. Confirmation that any containment measures (i.e. bunds) are intact and that records be kept of the effectiveness and augmentation of these facilities. Comply with the Acid Sulfate Soils Management Plan (PCF-PD-EN-ASSDMP)	**Indicator** ASS and PASS stockpiling (noting the weight of stockpile and length of time stockpiled for). Bunding provisions. Presence of limestone guard layer. Records of Hazmat's and DGs storage and handling. **Method** Monitoring of MTS. Inspections ASS Stockpiles will be monitored for	Compliance with SWM Target 20 will be reported in the CAR, as per Section 2.4.3 and in alignment with the CAP. CAR submitted to EPA Reporting of non-compliance as per Section 2.4.5.

Management Actions	Management Targets	Monitoring	Reporting
Method for calculating neutralisation rate. ▪ Stockpiles will be inspected regularly for integrity and intactness. ▪ Stockpiles will be contained by bunding as per **Management Action 9.** ▪ If disturbance of <1,000 tonnes of ASS occur with stockpiling at the causeway or Site C then soil can be stockpiled for up to 70 hours before soil has to be neutralised as per **Management Action 19**. ▪ If soil is to be stockpiled longer than 70 hours, then a risk assessment will be required and additional management measures such as leachate capture and periodic application of lime to neutralise acidity. ▪ For all stockpiling, a guard layer of crushed limestone should be used to protect underlying soils. The guard layer should also include a bund around the guard layer to contain any surface runoff in the event of rainfall. The base of the guard layer or treatment pad should be at least 300 mm thick with 150mm high bund walls to contain treated soils and any effluent associated with direct rainfall on stockpiles. ▪ Confirmation that handling and storage of hazardous materials is undertaken in accordance with relevant legislation and regulations (including Dangerous Goods) and that records are kept of said handling and storage The OWNER has prepared an Acid Sulfate Soils Management Plan (PCF-PD-EN-ASSDMP) due to the likely disturbance of ASS.		oxidation, erosion and leachate production.	

2.3 Environmental Monitoring – Surface and Ground Waters

This section sets out monitoring provisions for determining whether trigger and threshold criteria for surface water and groundwater are exceeded, and ultimately whether the condition environmental objectives are being achieved. A discussion on how the monitoring provisions have been developed follows.

Monitoring will be undertaken along the extent of the Project to determine whether the trigger and threshold criteria are being met.

Monitoring will occur in accordance with condition 8-2 (5) 8-2 (7) of Ministerial Statement 1180, monitoring will continue to be implemented until the CEO of the DWER has advised that the environmental outcome has been met and the plan is no longer required to be implemented in accordance with Condition 8-4.

The monitoring provisions in this plan are set out in Table 2-3. The monitoring sites listed in Table 2-3 are shown in Figure 2-1 for surface waters, and in Figure 2-2 for groundwaters.

2.3.1 Rationale for Monitoring Provisions

2.3.1.1 Methods

Methods outline in Table 2-1 and 2-3 are based on best practise and adherence to relevant guidelines and standard operating procedures. The groundwater and surface water monitoring methods for each monitoring event will be kept consistent with baseline survey (Coffey, 2022b) (**Attachment I**).

2.3.1.2 Monitoring Site Locations

The location of all monitoring sites is based on the known groundwater and surface water flow directions, location infiltration and tidal zones and discharge areas from the Project envelope.

The current monitoring network will enable identification of local and regional changes in the water quality and changes to hydrological regimes and surface water flow in the vicinity of sensitive receptors.

2.3.2 Surface Water Monitoring Program

The Surface Water Monitoring Program includes locations, frequency, measurement protocols, assessment protocols, management commitments and reporting arrangements to demonstrate that the water quality targets are met. Monitoring required against each performance criterion and management action / target is included within Table 2-1 and Table 2-2. Table 2-4 summarises the monitoring parameters and methods that will be utilised. Table 2-5 provides the monitoring parameters to be monitored per location type within the Perdaman site boundaries. Table 2-6 provides guidelines for the adopting of threshold levels to be adhered to once baseline monitoring has been completed.

Where data for a reference/control site have only been collected for a limited period and the reference condition cannot be clearly characterised, the power of detection should be increased by using more indicators, and/or more reference/control sites and/or more monitoring sites placed along any probable disturbance gradients (ANZECC & ARMCANZ 2000).

Physical and chemical water quality parameters to be adhered to for surface water discharge are included in Table 2-5. Due to the periodic nature of surface water flows and no permanent, closed water body to take representative samples from on site: all diversion channels and hold ponds will be monitored for the presence of contaminants and compliance with the criteria in Table 2-6 before being compared to surface flow baseline data.

In terms of assessing the relevance of groundwater and surface water quality results in relation to protecting environmental values, the adopted assessment criteria are based on the requirements of the following guidelines and standards:

- HEPA (2020) PFAS National Environmental Management Plan (NEMP), Version 2.0 Final 2020.
- NEPC (2013) National Environment Protection (Assessment of Site Contamination) Measure (1999) as amended 2013. National Environment Protection Council
- DWER (2021) Assessment and management of contaminated sites.

Adopted groundwater and surface water criteria consider the following information obtained (Coffey, 2022b):

- Groundwater within the superficial aquifer beneath the site discharges to the Indian Ocean.
- Groundwater and surface water from the site discharges to supratidal areas with eventual discharge
- to King Bay.
- Therefore, groundwater results for Contaminants of Potential Concern (COPC's) will be screened against the 95% species protection criteria for slightly to moderately disturbed systems. However, for PFAS a high conservation value systems criterion will be adopted as the Water Quality Guidelines (WQG's) advise that the 99% level of protection be used for slightly to moderately disturbed systems.

- Based on the TDS of the groundwater and surface water, the highest beneficial use at the Site is Aquatic Ecosystems (Marine Water).
- It is also plausible that groundwater is abstracted for process use at surrounding industrial sites.
- On this basis, the adopted Investigation Levels (IL) for groundwater and surface water during the baseline studies and subsequent monitoring events are:
- **NEPM (2013) and DWER (2021)**
    - Australia and New Zealand Water Quality Guidelines (ANZG, 2018) - Marine Water 95% Species Protection
    - ANZECC and ARMCANZ (2000) (Table 3.3.4) – Pilbara and Kimberley regions slightly disturbed ecosystems
    - DoH (2014) Domestic Non-Potable Use (NPUG) (including WHO 2008 for TRH)
    - Health Screening Levels (HSLs) Vapour Intrusion – Commercial/Industrial
- **HEPA (2020)**
    - Human Health - Recreational water quality
    - Ecological Water Quality – Freshwater 99% species protection
- **United States Environmental Protection Authority (US EPA, November 2021)**
    - Regional Screening Levels (RSLs)

Table 2-3 – Surface Water Monitoring Provisions

Environmental Value	Method Summary	Monitoring Site	Parameters to be analysed	Frequency (during construction)	Frequency (post construction)
Surface water quality relevant to Supratidal flats	Surface water quality: ▪ Measure physicochemical water quality at the surface water locations and collect samples, if surface water is present. Note observations if no surface water is present at the time of survey. All sampling is to be undertaken in accordance with relevant guidelines and standard operating procedures.	Surface water sampling Group: ▪ SW1 – Site C ▪ SW2 – Site C ▪ SW3 – Site C ▪ SW4 – Site F ▪ SW5 – Site F ▪ SW6 – Site F ▪ SWDC1 – Site C ▪ SWDC2 – Site C ▪ SWDC3 – Site F	Metals Nutrients and physical Parameters Ethanolamine's TRH BTEXN PAH	Monthly in construction zones.	Biannually (March and September).
Surface water flows to Supratidal flats	Visual inspection and measurement of backwater or ponding of water.	Hydrological Monitoring Sites SW1 through to SW6	Backwater or ponding of water.	Immediately after significant rainfall events (over 15 mm rainfall), and then daily for three days while standing water is present.	Once annually in February, immediately after a significant rainfall event (over 15 mm rainfall), and then daily for three days while standing water is present.

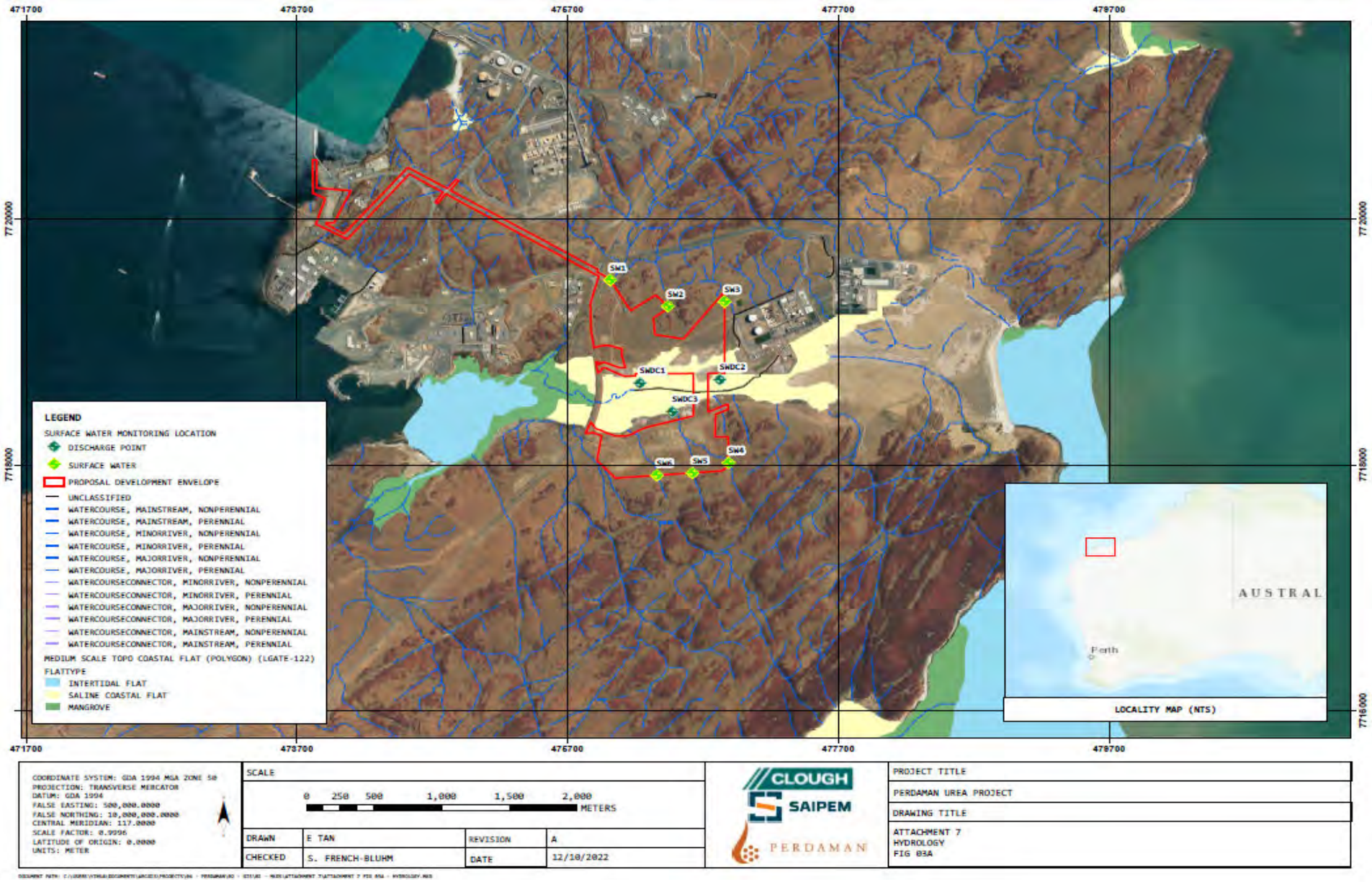

Figure 2-1 Surface Water Monitoring Locations

Table 2-4 Monitoring Parameters and Methods

Monitoring Parameters	Method	Timing
Rainfall	Rainfall gauge	Daily
Surface Water Quality	Field measurements using calibrated instruments Field sample and laboratory analysis (analysis suites)	During / directly after rainfall events
Water Elevation	Pressure transducers Peak Level indicators	Weekly

Table 2-5 Monitoring Parameters, Associated Locations and Frequency

Type	Monitoring Parameters	Site / location [4]	Frequency
Rainfall	Rainfall (mm)	Within PDE	Daily (to associate potential trends of groundwater, surface water variation with rainfall)
Surface Water Discharge Points (excluding MUBRL)	Surface Water Quality[1] - pH - DO - Turbidity - Floatable matter - Settleable matter - Toxicants - Nutrients	Discharge structures DS01, DS02 and DS03 from sites 'C' and 'F'. Site 'C' stormwater collection pond. Site 'F' stormwater collection pond.	During / after rainfall events
Surface Water Hold Points	Water Elevation Surface Water Quality[1] - pH - DO - Turbidity - Floatable matter - Settleable matter - Toxicants - Nutrients	Oily water treatment unit. Saline evaporation pond. Saline water pond. Cooling tower basin. Site 'C' stormwater collection pond. Site 'F' stormwater collection pond.	During / after rainfall events
Surface water diversion channels	Water Elevation Sedimentation / erosion Surface Water Quality[1 & 2] Surfactants (detergents)	Diverted run-off stream from sites 'C' and 'F'. Clean run-off stream from site 'C'. Clean run-off stream from site 'F'. All other diversion channels and trenches.	During / after rainfall events
Oily water pond, hydrocarbon storage areas, Wash down facilities.	Surface Water Quality2 - pH - DO - Turbidity - Floatable matter - Settleable matter - Toxicants - Nutrients	Oily water treatment unit. DG's and hydrocarbon storage areas. All wash down facilities.	Weekly spills and water quality checks. Water elevation monitored during / after rainfall events.
Sediment basins	Quantity of sediment in basins not to exceed 30% as indicated by depth pegs.	All water storage and treatment ponds.	Weekly

Type	Monitoring Parameters	Site / location [4]	Frequency
MUBRL	As per Part V monitoring requirements.	Saline water pond Pipeline monitoring location prior to MUBRL receival.	Weekly

[1] Water Quality Protection Note 11 - Guidelines for Mining and Mineral Processing – Mine dewatering (Water and Rivers Commission 2000)

[2] Water Quality Protection Note 68– Mechanical equipment wash down (DoW, 2013))

[3] Ministerial Statement No. 0567. Statement that a Proposal may be Implemented – Desalinated Water and Seawater Supplies Project Burrup Peninsula, Shire of Roebourne.

[4] See Attachment A. Project Surface Water Schematic and Plot Plans, for monitoring locations and drainage context.

Table 2-6 Receiving Water Quality Criteria (Water Quality Protection Guidelines No. 11, 2000).

Indicator	Criterion
pH	Discharge water should not cause the seasonal background pH of the receiving waterbody to vary by more than ± 0.5 units.
Total Dissolved Solids (TDS)	Discharge water should not cause the seasonal background TDS of the receiving waterbody to vary by more than 10%.
Dissolved oxygen (DO)	Discharge water DO concentration should not cause the seasonal background DO concentration of the receiving waterbody to decrease by more than 10%.
Suspended solids/turbidity	Discharge water should not cause the suspended solids/turbidity seasonal background concentration of the receiving waterbody to increase by more than 10%.
Floatable matter	Discharge water should not be the cause of visible floating oil, foam, grease, scum, litter or other objectionable matter being present in the receiving waterbody.
Settleable matter	Discharge water should not cause the deposition of settleable matter that may adversely affect the visual, recreational, and ecological values of the receiving waterbody.
Odours and colours	Discharge water should not produce discernible variation in odour or colour in the receiving waterbody.
Temperature	Discharge water should not cause the receiving water temperature to vary by more than 2°C from its seasonal background temperature.
Toxicants	The level of toxicants discharged (e.g. cyanide, heavy metals) should not cause the seasonal background concentration of toxicants in the receiving waterbody to increase by more than 10%.
Radionuclides	Radionuclides in the discharge water should not cause the receiving waterbody's seasonal background radionuclide concentration to increase by more than 10%.
Nutrients	Discharge water should not add nutrient substances or other growth stimulants (e.g. phosphorus, nitrogen) in quantities sufficient to cause excessive or nuisance algal growth in the receiving waterbody.

The above water quality parameters of Table 2-6 provide a general guideline to infer potential contaminants present in discharge water / surface water run-off. Since the waters of King Bay will be the only permanent water body subject to discharge from the project, these parameters will instead be applied in the following manner:

- **pH** – monitoring for pH will occur in hold ponds of received waters.
- **TDS** – monitoring of the hold pond waters to be released to the MUBRL. TDS of MUBRL discharge is not to exceed 55, 000mg/L.
- **Dissolved Oxygen** – Monitoring for DO will occur in hold ponds to infer possible nutrient loading, i.e. increased total phosphorus (TP) and total nitrogen (TN) concentrations and algal presence.
- **Turbidity** – Monitoring in hold ponds to determine effectiveness of sediment settlement and monitoring in diversion channels during rains to infer effectiveness of upstream sediment controls.
- **Floatable matter** – visual inspections of hold ponds and monitoring during rains. This is most applicable to the oily water pond and its operational integrity / effectiveness of removing hydrocarbons.
- **Settleable matter** – As sediment basins are used on the Project, monitoring of sediment depth pegs to ensure the basin capacity is not breached or restricts the hold pond water volume capacity, in addition to restricting settleable matter from being discharged.

- **Odours and colours** – these parameters will indicate the potential presence of oils, petrochemicals and undesirable constituents in the water column. Note that colour may be subject to inputs from organic humic and fulvic acids.
- **Temperature** – temperature monitoring at the monitoring location prior the MUBRL. Temperature not to exceed 5°C (2°C for 80% of the time) above ambient seawater temperature. Details of ambient seawater temperatures to be provided by the Water Corporation.
- **Toxicants** – monitoring of all surface water drainage / run-off channels and hold ponds to capture the presence of contaminants that may have a deleterious effect on the surrounding environment.
- **Radionuclides** – monitoring for unstable nuclide or isotopes (especially if groundwater is used on site) in hold ponds.
- **Nutrients** – organic carbons and total nitrogen and phosphorus will be monitored for in site hold ponds, especially streams which originate from the sewerage lines.

All water samples taken from site are to be appropriately labelled with the time, date and location taken so proper inferences to the source of potential pollutants can be made upon analysis.

Table 2-7 Indicative Wastewater Discharge Criteria (Water Quality Protection Note. 68, 2013).

Component	Limiting Criteria
Salinity (electrical conductivity)	1800 µS/cm (maximum)[1]
Surfactants (detergents)	5 mg/L (maximum)
Total Petroleum Hydrocarbons	15 mg/L (maximum)
BTEX (benzene, toluene, ethyl benzene and xylene)	10 µg/L (cumulative maximum)
Other toxic soluble contaminants	Ten times the guideline criteria or investigation trigger for local water values as published in the relevant National water quality management strategy guideline criteria to protect local water resource values (references 1a and 1b).

[1]Limiting criteria for salinity not applicable after confirmation by Coffey (2022b) of the hypersaline nature of groundwater on site.

Wastewater from site amenity and washdown facilities will be treated and recycled where possible on site, and management measures to mitigate impacts from heavy wastewater is addressed in the Hydrocarbons and Hazardous Substances Protocol and the Solid and Liquid Wastes Management Protocol. Table 2-7 above describes the discharge criteria of wastewaters, however; due to the combined nature of run-off waters on-site, the parameters detailed in Table 2-7 above will also be adhered to with the following exception:

- ‘Other toxic soluble contaminants’ monitoring will be consistent with ‘Toxicant’ monitoring of Table 2-6, and in alignment with details of Section 2.3.2.

2.3.3 Groundwater Monitoring Program

In order to minimise Project attributable impacts on groundwater quality, flow direction and/or depth to maintain the hydrological regimes and quality of groundwater and surface water to protect environmental values, a Groundwater Monitoring Event (GME) should be undertaken every three (3) months. The results of the GME should be compared to both baseline data and relevant trigger values to identify impacts to groundwater during construction and site operations. If relevant trigger criteria are breached, management measures should be implemented to control and prevent further impacts from occurring. Table 2-8 below outlines the details of the proposed monitoring program for the Perdaman site. The parameters selected are based on the likely Potential Contaminants of Concern (PCoCs) present during construction of the site and during site operations.

Table 2-8 Proposed Groundwater Monitoring Schedule (Coffey, 2022b)

Sample Locations	Frequency	Parameters	Trigger Values	Threshold Values
BH12, BH22, BH27, BH31, MW01, MW02, MW03, MW04, MW05, MW06, MW07, MW08, MW09, MW10	Quarterly	Depth to Groundwater (mBTOC) Depth to Groundwater (mAHD)	Continuous increasing trend Continuous decreasing trend	Continuous increasing/decreasing trend of >12 months
		Physical Parameters (including major ions, pH, EC and ORP)	Major ions = Significant change (i.e. +/-25%) from baseline chemistry. pH = 1 pH unit decrease. EC = 20% change under same tidal conditions. ORP = Change from oxidising to	Major ions = +/-30% from baseline chemistry pH = <4.5 EC = 30% change under same tidal conditions ORP = Change from

			reducing or vice versa.	oxidising to reducing or vice versa.
		Total Recoverable Hydrocarbons (TRH)	Baseline value (where detected) +10%. Where Baseline value is <LOR, trigger is equal to LOR.	Maximum concentration + 1 Standard Deviation Table 2-8
		Benzene, Toluene, Ethylbenzene and Xylene (BTEX)	Where Baseline value is <LOR, trigger is equal to LOR.	Exceedance relative to designated environmental criteria (Marine Water LOSP 95%)
		Nutrients (Ammonia, Total Nitrogen, Nitrite, Nitrate and Total Kjeldahl Nitrogen)	Baseline value (where detected) +10%. Where Baseline value is <LOR, trigger is equal to LOR.	Maximum concentration + 1 Standard Deviation
		Metals (Total Iron, Total Aluminium, Arsenic, Cadmium, Cobalt, Copper, Lead, Chromium, Nickel, Selenium and Zinc)	Baseline value (where detected) +10%. Where Baseline value is <LOR, trigger is equal to LOR.	Maximum concentration + 1 Standard Deviation

*N.B – Baseline values provided in Appendix E of **Attachment I**

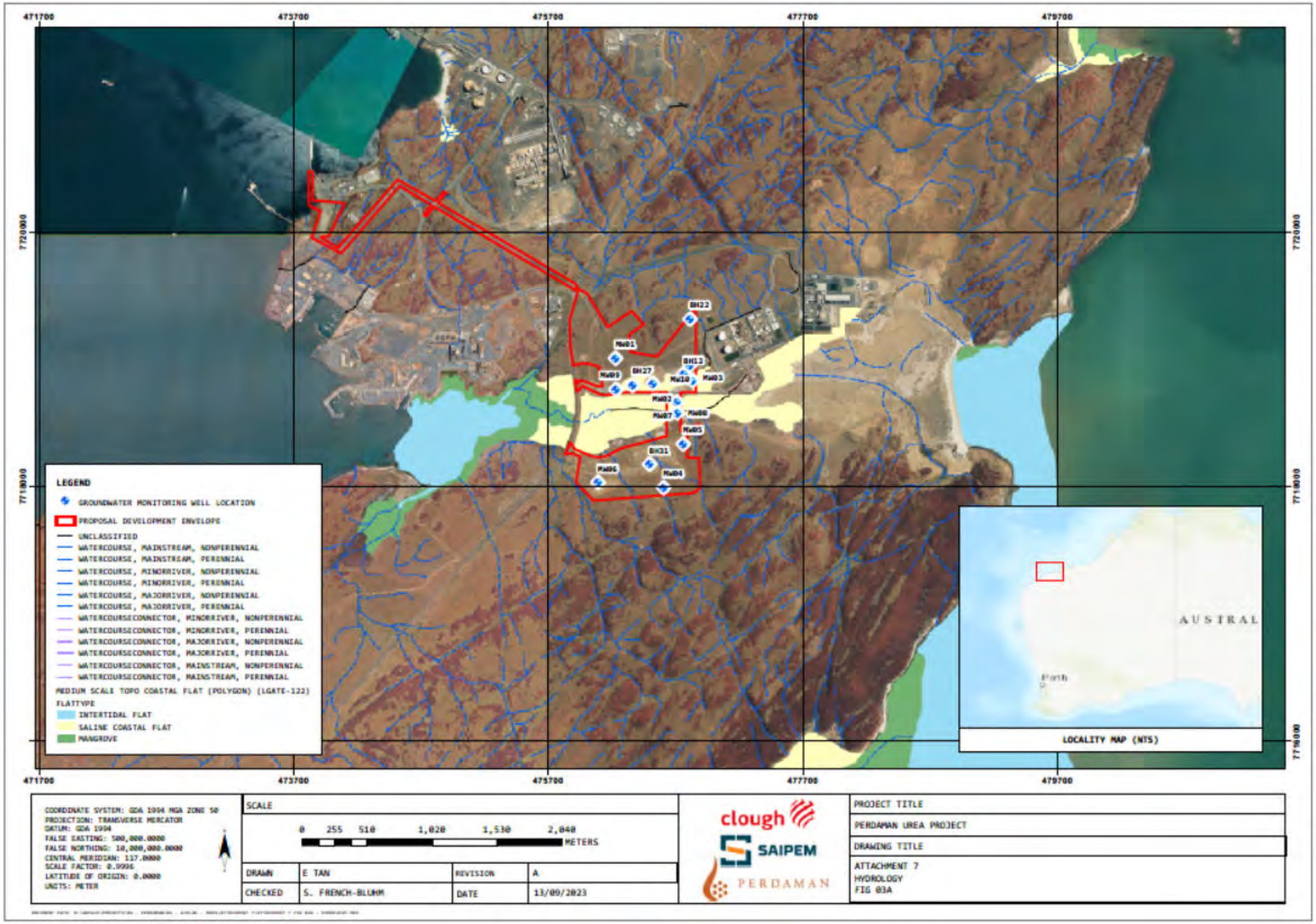

Figure 2-2 Ground Water Monitoring Locations

2.4 Environmental Reporting & Compliance Requirements

Compliance with this SWMP will be reported in a timely manner to the HSSE Manager after each inspection and audit. Corrective actions will be recorded and monitored as per the non-conformance tracking system to ensure continual improvement and enable the close out of incidents.

Any stormwater, surface water, erosion or sedimentation incidents resulting in offsite impacts will be reported to the HSSE Manager (or their representative) as soon as possible.

Annual reports will be prepared by Perdaman for submission to the appropriate Regulators. These will include general conformance, new risks and hazards identified, corrective actions implemented, sampling results and incident and investigation reports.

2.4.1 Environmental Reporting

Perdaman is responsible for the preparation of overall Project related environmental reports including compiling data from monitoring programs.

As per the Conditions of the MS 1180 (Condition 8-5) Perdaman shall report the monitoring results against the trigger criteria and threshold criteria specified in Table 2-1 of Section 2.1, to demonstrate compliance with Condition 8-1(1) (objective) has been met over the reporting period in the Compliance Assessment Report (refer to Section 2.4.3). To do this accurately, Perdaman will compile monitoring data and relevant environmental information on a **monthly** basis across the Project and across all the relevant phases (including construction, commissioning and operations).

This will include relevant surface water and ground disturbance information such as:

- Shapefiles of clearing footprints.
- Compliance with GDP conditions.
- Update of Project clearing budgets.
- Topsoil stockpile compliance.
- Dust monitoring results and non-compliances; and
- Rehabilitation outcomes.
- Results against management targets
- Results against surface water objectives

Reporting to external stakeholders and regulators will be in strict accordance with the Project's approval conditions.

Reporting of exceedance of threshold criteria and non-compliance with the Ministerial Statement (1180) is addressed in Section 2.4.4 and 2.4.5.

2.4.2 Environmental Performance Report

An Environmental Performance Report shall be submitted to the Minister and MAC every five (5) years in accordance with Condition requirements detailed in Condition 12 (MS 1180). With the first report being submitted within three (3) months of the expiry of the five-year period commencing from the first date of Ground Disturbing Activities or another time approved by the CEO.

- Relative to surface water, the Performance Report shall report on the following:
- State of flora and vegetation
- State of Groundwater
- State of Surface Water

The report shall include a comparison of those values mentioned above at the end of the five-year period against the state of each value at the beginning of the five-year period. Also, a comparison of the environmental values identified above at the end of the five-year period; against the state of the environmental values identified in first Environmental Performance Report submitted in accordance with Condition 12-2. Additionally, the report will include the proposed Adaptive Management and continuous improvement strategies.

2.4.3 Compliance Assessment Report

Perdaman is to submit to the CEO of the EPA a Compliance Assessment Report (CAR) annually in accordance with MS 1180. The CAR's are to be prepared in accordance with the Confirmed Compliance Assessment Plan (PCF-PD-EN-CAP).

The first Compliance Assessment Report (CAR) is to be submitted to the CEO fifteen months from the date of issue of MS 1180. The Statement was issued on January 24 2022. Therefore, the first CAR was due 24 June 2023. CAR's are required annually from the date of submission of the first CAR, therefore, by 24 June, each year.

The CAR demonstrates Perdaman's compliance with MS 1180 through monitoring results in comparison to the established trigger and threshold criteria. This will help to identify non-compliances.

In accordance with Condition 15-7 of MS 1180, each CAR shall:

1. be endorsed by the OWNER's Chief Executive Officer or a person delegated to sign on the Chief Executive Officer's behalf;
2. include a statement as to whether the OWNER has complied with the Conditions;
3. identify all potential non-compliances and describe corrective and preventative actions taken;
4. be made publicly available in accordance with the approved Compliance Assessment Plan; and
5. indicate any proposed changes to the Confirmed Compliance Assessment Plan (PCF-PD-EN-CAP) required by Condition 15-2.

Specific to Surface Water management objectives, the CAR will report on the following status presented in Table 2-9 below.

Table 2-9 Condition Environmental Management Plan Reporting Table

Condition environmental outcome	Environmental Criteria	Status Justification	Status (achieved, yes/no)
Maintain the hydrological regimes and quality of surface water so that environmental values are protected.	**Trigger Criterion 1** Presence of backwater or ponding of water from the edge of the development envelope over a period of two consecutive days from the date ponding was identified at distances further than 6 m.	Comment as required	
	Threshold Criterion 1 Presence of backwater or ponding of water from the edge of the development envelope over a period of two consecutive days from the date ponding was identified at distances further than 10 m.	Comment as required	
	Trigger Criterion 2 Surface water quality trigger criteria. (refer to Table 1-4).	Comment as required	
	Threshold Criterion 2 Surface water quality threshold criteria. (refer to Table 1-4).	Comment as required	
	Trigger Criterion 3 Groundwater quality trigger criteria.	Comment as required	
	Threshold Criterion 3 Groundwater quality threshold criteria.	Comment as required	
	Trigger Criterion 4 Groundwater level trigger criteria.	Comment as required	
	Threshold Criterion 4 Groundwater level threshold criteria.	Comment as required	

2.4.4 Exceedance of Environmental Objectives & Threshold Criteria

In accordance with Condition 8-5, in the event that the environmental objective in Condition 8-1 is not achieved, or monitoring or investigations at any time indicate an exceedance of threshold criteria specified in this plan, the OWNER shall:

1. Report the exceedance in writing to the CEO within **seven days** of the exceedance being identified;
2. Implement the management and/or contingency actions specified in the Confirmed Surface Water Management Plan as required by Condition 8-2(6) within seven days of the exceedances being reported as required by Condition 8-5(1) or such lesser time specified in the Confirmed Surface Water Management Plan and continue implementation of those actions until the CEO has confirmed by notice in writing that it has been demonstrated that the threshold criteria are being met and implementation of the management and/or contingency actions are no longer required;
3. Investigate to determine the cause of the threshold criteria being exceeded in accordance with Condition 8-5(3).
4. Investigate to provide information for the CEO to determine potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded;
5. provide a further report to the CEO within **twenty-one** days of the exceedance being reported as required by Condition 8-5(1) and such further report shall include:
    - details of management and/or contingency actions implemented;
    - the effectiveness of the management and/or contingency actions implemented against the threshold criteria;
    - the findings of the investigations required by Conditions 8-5(3) and 8-5(4);
    - measures to prevent the threshold criteria being exceeded in the future;
    - measures to prevent, control or abate the environmental harm which may have occurred; and
    - justification of the threshold criteria remaining, or being adjusted based on better understanding, demonstrating that outcomes will continue to be met.

2.4.5 Non-compliance with Ministerial Statement 1180

In accordance with Condition 8-6, Perdaman must not cause or allow, (without limiting Condition 8-4 and notwithstanding compliance with Condition 8-5) any of the following:

1. A failure to implement one or more management and/or contingency actions if the relevant threshold criteria have been exceeded.
2. The exceedance of a threshold criteria (regardless of whether management and/or contingency actions have been or are being implemented), and/or;
3. Failure to comply with the requirements of this Confirmed Surface Water Management Plan.

2.4.6 Compliance with MS 1180

Table 2-10 provides a summary of environmental criteria reporting requirements and Condition reporting as specified by Ministerial Statement 1180.

Table 2-10 Reporting Requirements

Condition	Reporting Requirement	Reporting Timeframe
8-5 (1)	Advise the CEO within seven days (7 days) of the non-compliance or the exceedance of trigger or threshold in writing	Within Seven (7 days).
8-5 (5)	Provide a report to the CEO of the exceedance that includes the points listed above in section 2.4.4 (5).	Within 21 days.
12-1	Submit to the Minister and MAC every five (5) years a Environmental Performance Report. The report will include (relevant to this Plan) State of Groundwater State of Surface Water State of Holistic Environment State of Flora and Vegetation	Within three months of the expiry of the five-year period commencing from the first date of **Ground Disturbing Activities.**
15	Provide a Compliance Assessment Report to the CEO addressing the requirements within Condition 15-7.	24 April 2023 (First CAR due) Annually following submission

		of first CAR.

3 Adaptive Management & Review

Perdaman will employ adaptive management throughout surface water and erosion monitoring to incorporate knowledge from the implementation of mitigation measures, monitoring and evaluation of data against trigger and threshold criteria to meet the environmental objectives more effectively in the Plan. The adaptive management approach of reviewing the management targets for surface water on the Project and evaluating and monitoring the applied management and mitigation measures against the objectives (Condition 6-1 and 8-1) will be done in response to monitoring the targets, triggers and thresholds in Table 2-1 and Table 2-2.

The following approach will be implemented:

- Monitoring data will be systematically evaluated and compared to baseline data or survey data on an annual basis to verify whether surface water or erosion responses to the construction and operation activities are same or similar to the impacts predicted.
- Re-evaluate risk assessments annually.
- Incorporate additional knowledge as it comes to hand to address assumptions and uncertainties to gain a greater understanding of surface water characteristics and site hydrology / hydrogeology.
- Complete review of risk-based priorities after annual monitoring is completed.
- Increase understanding of surface water and groundwater hydrology, and vegetation responses to hydrological regimes through annual interpretation, ground-truthing and analysis of monitoring data.
- Undertake revision when management measures are not as effective as predicted, or trigger levels do not have the outcome anticipated or required.
- Incorporate alternative techniques, technologies and methodologies to enhance and improve the program;
- Expand surface water and erosion monitoring as required to respond to additional operational activities that may pose a threat to environmental values.
- Incorporate and modify the program to include any external changes during the life of the Project (e.g. changes to the sensitivity of the vegetation, climate change, implementation of other activities in the area, etc.).

Potential adaptive management actions may include, but are not limited to:

Exceedance of trigger or threshold criteria for groundwater or surface water quality or level:

- Determine/investigate cause/source.
- Improve and implement additional trigger level actions or threshold contingency actions as necessary.
- Monitor the success of remedial actions.

Identification of LOR equivalent trigger criteria value exceedance:

- Determine/investigate cause/source.
- Conduct different laboratory analysis with lower LOR value below trigger level value.
- Revise trigger level value as necessary.
- Improve and implement additional trigger level actions or threshold contingency actions as necessary.
- Monitor the success of remedial actions.

3.1 Surface Water Management Plan Review

Any revisions or amendments of this SWMP must be submitted to the CEO of the EPA as per Condition 8-7 of MS 1180. As this SWMP is a Condition of the MS 1180, Perdaman must seek formal approval from the Office of the EPA to amend a provision within this SWMP based on any information gained through the adaptive management approach taken.

This SWMP will be reviewed and updated upon meeting the following conditions:

- At least annually throughout the life of the Project
- Where changes are required following the evaluation of monitoring data
- Following review of assumptions and uncertainties
- Following re-evaluation of risk assessment
- An increased understanding of the environmental setting
- Changes to the Project scope or technology
- Specialist advice
- Stakeholder consultation

- Review will also include a gap analysis of current early response actions, trigger response actions and threshold contingency actions to identify non-compliances and where necessary any additional actions that may be required to minimise risk of further exceedance.

In accordance with ministerial Condition 8-7, Perdaman in consultation with MAC:

- May review and revise a Confirmed Surface Water Management Plan and submit it to the CEO and the DCCEEW.
- Shall review and revise a Confirmed Surface Water Management Plan and submit it to the CEO and the DCCEEW as and when directed by the CEO.

4 Stakeholder Consultation

This Confirmed Surface Water Management Plan has been prepared in consultation with Murujuga Aboriginal Corporation (MAC) in accordance with Condition 8-2 of Ministerial Statement 1180. Reviews and revision of the SWMP will be done in consultation with MAC, with submissions to be sent to the CEO and the DCCEEW as directed by the CEO.

Perdaman shall provide for the relevant traditional owners to be invited to observe any Ground Disturbing Activities and during construction activities and take reasonable steps to facilitate the observation of those activities by those persons.

Additionally, Perdaman have carried out stakeholder consultation with other key stakeholders. The consultation register in Table 4-1 summarises the consultation and Perdaman responses, and the most recent consultations with the Murujuga Aboriginal Corporation are included as **Attachment F** and **Attachment G** of this plan.

Table 4-1 Stakeholder Consultation Register

Date	Stakeholder	Consultation Type	Issues, Topic Raised	OWNER Response
31 Jan 2022	Murujuga Aboriginal Corporation (MAC) and Circle of Elders	Presentation / Meeting / Endorsement of CHMP	Presentation of the salvage and relocation proposal for the Cultural Heritage Management Plan (CHMP) (PCF-PD-EN-CHMP).	Endorsement of the amended CHMP and of the salvage and relocation methodology.
24 Jan 2022	Murujuga Aboriginal Corporation (MAC)	Site visit/ Presentation	MAC Board • Presentation of key aspects of this amended Surface Water Management Plan for discussion. • Opportunities • Potential challenges and solutions.	None Required.
2019 & 2020 (Various times during this period)	Hon. Alannah MacTiernan	Presentation / Meeting	Project update including: - Community stakeholder consultation & feedback - Environmental Impact Assessment - Common-user infrastructure - Social benefits - Employment opportunities - Training opportunities	• Details discussed including potential social and economic benefits • Commercial arrangements with PPA and Water Corporation
January 2020	MAC	In principle Endorsement of Heritage Charter	Overarching Perdaman Project Destiny Overarching Position for Heritage Interaction and management, including Rock Art and Murujuga.	In principle (subject to final Part IV approval of Project) endorsement of OWNER commitment to its overarching position which will underpin Aboriginal Heritage Management Plans, protocols and actions for life of the Project
November & December 2019	Hon. Mark McGowen, Premier	Presentation / Meeting	Project update including - Community stakeholder consultation & feedback - Social benefits - Employment opportunities - Training opportunities - Environmental Impact Assessment - Common-user Infrastructure	• Details discussed including potential social and economic benefits • Commercial arrangements with PPA and Water Corporation
November 2019	Hon. Ben Morton, Assistant Minister to the Prime Minister and Cabinet	Presentation / Meeting	• Project update including - Community stakeholder consultation & feedback - Social benefits - Employment opportunities - Training opportunities - Environmental Impact Assessment - Common-user Infrastructure	• Details discussed including potential social and economic benefits • Commercial arrangements with State GTEs and common-user infrastructure requirements

27 November 2019	MAC	Agreement Signing	Signing of Commercial Agreement, transformative opportunities	Agreement on mutual support for future aspirations of both parties
14 October 2019	Kevin Michel MLA, Karratha	Briefing	• Update on the Environmental Impact Assessment Update on liaison with other community stakeholders	Details discussed
14 October 2019	City of Karratha, PDC	Meeting	• Update on the Environmental Impact Assessment • Discussions about the housing strategy, City of Karratha is supportive of a strategy that will provide long-term benefits to the community	• Details discussed Accommodations for the Project will be integrated to the local community rather than building isolated camps
14 October 2019	Circle of Elders	Presentation / Meeting	• Access to the meeting site in the south-west corner to Site F • Location of the proposed infrastructure on site • Transformative opportunities	• The fence that will be installed aims at preventing site workers to access the cultural site and will not block access for the Traditional Owners (TO) • Refer to Figures in Appendix A of the ERD Commercial Agreement to be signed with MAC
14 October 2019	MAC	Workshop	• Commercial Agreement, transformative opportunities	Further discussions to be held between MAC and the OWNER
September 2019	Hon. Ben Wyatt, Treasure	Presentation / Meeting	• Update on Project including the Environmental Impact Assessment	Details discussed including potential social and economic benefits
20 September 2019	MAC & Advisors	Meeting	• Commercial Agreement, transformative opportunities	Further discussions to be held between MAC and the OWNER
4 September 2019	MAC & Advisors	Meeting	Commercial Agreement, transformative opportunities	Further discussions to be held between MAC and the OWNER
June-August 2019	Pilbara Ports Authority (PPA)	Online form, letter	• Panamax size vessels Capacity of the shed at the Port	• The OWNER will be using high tides to access the berth Storage capacity at the port changed to 65,000 tonnes
05 July 2019	MAC	Presentation / Meeting	• Assessment timeline clarification Plant design	• The OWNER provided clarification regarding the environmental approval processes • The OWNER provided an update on the plant design MAC advised that they support the draft ESD and confirmed the Project aligns with their core objectives (ref. email to the EPA of the 8thJuly 2019)

June 2019	Karratha, Roebourne, Dampier and Wickham Community	Information booths, online form	• Project timeline Employment opportunities	Refer to Section 2.3.7 of the ERD.
16 May 2019	Pilbara Development Corporation (PDC)	Meeting	• PDC indicated a preference for flexible working hours for employees so they can pursue activities/sports Visual amenity	• The OWNER is committing to give the opportunity to all employees to request flexibility to pursue nominated activities/hobbies/sports. Refer to Section 4.9.5 (ERD)
16 May 2019	NYFL	Presentation / workshop	• Approach to monitoring and detriment to rock art • NYFL Chairman requested information about continuous access for Aboriginal people to NHL area thought to be associated with "Fish Thalu" site within the boundary of site F • Any changes to the access to Ngajarli as a result of Hearson Cove Road realignment • Access to the meeting site in the south-west corner of site F Visual aspects and opportunities	• The OWNER worked with Woodside to obtain a comprehensive regional airshed model (Section 4.8.5 and Appendix D). An Air Quality Management Plan and Heritage Management Plan have been developed (Appendix K) • The OWNER will make access arrangements whereby those with connection to the NHL site would be met at the gate and escorted to the sacred site. The sacred "Fish Thalu" site is outside the operational site boundary (refer to plan layout, Figure 3, Appendix A) • Hearson Cove Road will be realigned to its official gazetted alignment. Access to Ngajarli will be maintained • The construction-phase boundary has been modified to ensure this cultural site is outside of the fenced area and its use is not impaired Discussed opportunities to use the wall surfaces of project buildings and facilities as a medium for Aboriginal artworks and as a visual medium to communicate heritage stories
April 2019	Woodside	Meeting	Air Quality modelling	Data share agreement
February 2019	Senator Michaelia Cash, Federal Minister for Employment, Skills, Small and Family		Update on Project including –Potential social benefits –Potential employment & training opportunities –Potential economic opportunities	Details discussed

25 February 2019	Water Corporation	Letter	Discharge in the MUBRL and seawater intake	Appendix J of the ERD
12 February 2019	Murujuga Aboriginal Corporation (MAC) City of Karratha	Site visit / Presentation	MAC: • Construction phase, Site preparation, Plant erection • Potential Heritage issues • Plant emissions / impacts on Burrup Rock Art • General processing plant understanding • Employment, training and business opportunities • MAC could benefit from • Work undertaken to evaluate a Project location at Maitland City of Karratha: • The City of Karratha would prefer that the Dampier public wharf be used, and the shed located north of proposed options A & B.	Section 2.3.3 of the ERD Section 2.2.4 of the ERD Third option 'C' added to the Port infrastructure location options. Refer to Section 2.2.6 of the ERD

5 Changes to the SWMP (Surface Water Management Plan)

This Plan has been amended from the previous version PCF-PD-EN-SWMP_PCF1 to ensure that all commitments and Conditions required in accordance with Ministerial Statement 1180 are captured and addressed.

All changes to this FMP post-assessment must be provided separate to compliance reports and submitted to registrar@dwer.wa.gov.au.

Table 5-1 Changes to the Surface Water Management Plan (SWMP)

Complexity of changes			Minor revisions ☐	Moderate revisions ☐		Major revisions ☒	
Number of Key Environmental Factors			One ☐	2-3 ☒		> 3 ☐	
Date revision submitted to EPA:							
Proponent's operational requirement timeframe for approval of revisionReason for Timeframe:				< One Mth ☒	< Six Months ☐	> Six Months ☐	None ☐
Itemno.	EMP section no.	EMP page no.	Summary of change	Reason for change			
1	ALL	ALL	Document updated to include updated document references and correct legislative reporting requirements	Updated document references and legislative requirements.			
2	1.4	21	Add Pat V requirements	Reflects W6630 requirements			
3	1.5	21	Add RIWI Act requirements	Reflects Bed and Banks permit requirements			
4	1.6.3.1	25	Updated ASS information	Reflects ASS requirements			
5	Table 2-1	29	Updated legislative reporting	Reflects all current legislative reporting requirements			
6	2.4	76	Updated legislative reporting	Reflects all current legislative reporting requirements			
7	App L		Added	Inclusion of W6630			

6 References

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7 Definitions

Contractor

The Contractor on the Project is any individual or party engaged directly or indirectly by Perdaman, that is notan employee of Perdaman, to carry out the Project.

Environmental Representative

The Environmental Representative includes Perdaman's Environment and Heritage Manager, the Environmental Coordinator or their delegated representative.

Environment and Heritage Manager

The Environment and Heritage Manager is Perdaman's site based Environmental Representative who has the authority and responsibility for managing the implementation, compliance and effectiveness of the Project's environmental and heritage requirements.

Ground Disturbance Permit

A Ground Disturbance Permit (GDP) is a permit issued to a Subcontractor, by the Contractor, enabling Works within defined battery limits to manage any impacts on native vegetation, heritage or other environmentally sensitive values. It includes the key approval commitments and obligations obtained by or issued to the Contractor or Owner by regulators, tenure holders and other third parties.

May

Indicates that the Subcontractor is permitted to do something, or the Contractor reserves the right to dosomething according to the text.

Must

Indicates a requirement or action that must be followed to comply with legal framework for the Project and environmental approval conditions.

Perdaman

Perdaman Chemicals and Fertilisers Pty Ltd is the proponent of the Project.

Project Personnel

Project Personnel includes all persons working on the Project directly employed by Perdaman, or its Contractors.

Project Work Sites

The Project work sites include Area C, Area F, the causeway linking these two areas, the conveyor corridor tothe Port and the Port storage and loading infrastructure. It can also include any other Project relevant locationunder operational control of Perdaman.

No-Go Zones

No-Go Zones are defined areas within the Project's footprint which are not entered and or disturbed by Project activities. These areas are established to protect environmental, cultural heritage, infrastructure and other values from damage or other detrimental impacts.

Shall

Indicates that a statement is mandatory.

Should

Indicates a recommendation.

Will

Indicates a requirement or action that Perdaman or the Contractor will be implementing during the Project activities to ensure compliance with legal framework for the Project and environmental approval conditions.

Works

All work which SNC-Lavalin and or its Subcontractors are required to perform to comply with its obligations under the Contract.

8 Abbreviations

Abbreviation	Description
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment Conservation Council
ARI	Average Recurrence Interval
ASS	Acid Sulfate Soils
ASSMP	Acid Sulfate Soils Management Plan
BSIA	Burrup Strategic Industrial Area
CAR	Compliance Assessment Report
CEO	CEO of the Environmental Protection Authority
COPC	Contaminants of Potential Concern
DAWE	Department of Agriculture, Water and the Environment
DBLB	Dampier Bulk Liquids Berth
DCCEEW	Department of Climate Change, the Environment, Energy and Water
DoEE	Department of Environment and Energy
DMIRS	Department of Mines, Industry Regulation and Safety
DWER	Department of Water and Environmental Regulation
EMP	Environmental Management Plan
EPA	Environmental Protection Authority
EPC	Engineering, Procurement and Construction
ERD	Environmental Review Document
ESCP	Erosion and Sediment Control Plan
ESWMP	Erosion and Surface Water Management Protocols
EWSC	East West Services Corridor
FEED	Front End Engineering and Design
GDA	Ground Disturbing Activities
GDP	Ground Disturbance Permit
mBTOC	Meters Below Top of Casing
mBGL	Meters Below Ground Level
MRWA	Main Roads Western Australia
Mtpa	Million tonnes per annum
MUBRL	Multi-User Brine Return Line
PASS	Potential Acid Sulfate Soils
PEMP	Project Environmental Management Plan
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
PPA	Pilbara Ports Authority

PPM	Parts per million
SCJV	Saipem Clough Joint Venture
SWMP	Surface Water Management Plan
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons

9 Project Delivery Applicability

Proposals	☒ EPC	☒ Construction
Studies	☒ Project Management	☒ Commissioning
Preliminary Engineering	Technical Services	Site Services
FEED	Procurement	☒ Ops and Maintenance
☒ Detailed Design	☒ Construction Management	

Appendix 1 – Ministerial Statement (MS) Conditions Compliance Table

<table>
<tr><th>Condition No.</th><th>Condition</th><th>Section of this Plan</th></tr>
<tr><td>1</td><td>When implementing the proposal, the proponent shall ensure the proposal does not exceed the following extents or ranges:
<table>
<tr><th>Proposal element</th><th>Location
(as defined by the proposal amended under s 43A (12 May 2021))</th><th>Maximum extent or range</th></tr>
<tr><td colspan="3">Physical elements</td></tr>
<tr><td>Development envelope (Site C and F)</td><td>Figures 1, 2, 3 & 4</td><td>106.7 ha</td></tr>
<tr><td>Disturbance footprint (Site C and F)</td><td>Figures 1, 2, 3 & 4</td><td>73.05 ha.
Avoiding Cultural Heritage Sites IDs 9439, 26008, 9296, and MAC 004.</td></tr>
<tr><td>Laydown Area (Site F)</td><td>Figure 2</td><td>6.8 ha (temporary and episodic use).</td></tr>
<tr><td>Utility Block (Site C)</td><td></td><td>Power generation (installed Combined Cycle Gas Turbine – 100 MW capacity and installed solar – 3.5 MW capacity).</td></tr>
<tr><td colspan="3">Operational elements</td></tr>
<tr><td>Urea production plant</td><td>Figure 2</td><td>6,200 t/day</td></tr>
<tr><td>Ammonia plant</td><td>Figure 2</td><td>3,500 t/day</td></tr>
<tr><td>Saline water discharge</td><td></td><td>20 GL/yr (including excess treated wastewater) discharged into the existing Water Corporation Multi-User Brine Return Line.</td></tr>
<tr><td>Product storage areas</td><td>Figure 2</td><td>Urea (plant site): 75,000 t capacity, fully enclosed shed.
Urea (Dampier Port site): 75,000 t capacity, fully enclosed shed.</td></tr>
<tr><td>Urea shiploading system</td><td>Figure 2</td><td>Loading capacity of 2,200 t/h</td></tr>
<tr><td>Causeway</td><td>Figure 2</td><td>Culvert outflow velocities of less than 1.0 m/s</td></tr>
<tr><td colspan="3">Timing elements</td></tr>
<tr><td>Project life</td><td></td><td>Up to 80 years from date of this Statement</td></tr>
</table></td><td>N/A</td></tr>
<tr><td>6-1</td><td>The proponent shall implement the proposal to meet the following environmental objective:
(1) minimise project attributable impacts on groundwater quality, flow direction and/or depth to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected</td><td>Section 2.2</td></tr>
<tr><td>8-1</td><td>The proponent shall implement the proposal to achieve the following environmental objective:
(1) maintain the hydrological regimes and quality of surface water so that environmental values are protected.</td><td>Section 2.2</td></tr>
</table>

8-2 (See conditions 7-1 and 7-2 at end of this table for information regarding condition 8-2(2).)	At least six months prior to Ground Disturbing Activities within the development envelope delineated in Figure 2 of Schedule 1, or such lesser time approved in writing by the CEO, the proponent shall in consultation with the Murujuga Aboriginal Corporation, revise and submit to the CEO the Surface Water Management Plan, which shall: (1) demonstrate how the environmental objective in condition **8-1** will be achieved; (2) specify the treatment and management of potential acid sulfate soils in accordance with the requirements condition **7-1** and condition **7-2**; (3) specify trigger criteria that will trigger the implementation of management and/or contingency actions to prevent direct or indirect impacts; (4) specify threshold criteria to demonstrate compliance with condition **8-1**; (5) specify monitoring methodology to determine if trigger criteria and threshold criteria have been met; (6) specify management and/or contingency actions to be implemented if the trigger criteria required by condition **8-2(3)** and/or the threshold criteria required by condition **8-2(4)** have not been met; and (7) provide the format and timing for the reporting of monitoring results against trigger criteria and threshold criteria to demonstrate that the objective in condition **8-1** has been met over the reporting period in the Compliance Assessment Report required by condition **15-6**.	Section 2.2 (1) Section 2.2 (2) Section 2.1 (3) Section 2.1 (4) Section 2.1 and 2.2 (5) Section 2.1 and 2.2 (6) Section 2.1 and 2.2 (7)
8-3	The proponent must not commence Ground Disturbing Activities until the CEO has confirmed in writing that the Surface Water Management Plan submitted under condition **8-2** satisfies the requirements of condition **8-2.**	Section 1.3
8-4	The proponent shall implement the most recent version of the Confirmed Surface Water Management Plan until the CEO has confirmed by notice in writing that the proponent has demonstrated that the objective detailed in condition 8-1 has been met.	Section 1.1.2
8-5	In the event that the environmental objective in condition **8-1** is not achieved, or monitoring or investigations at any time indicate an exceedance of threshold criteria specified in the Confirmed Surface Water Management Plan the proponent shall: (1) report the exceedance in writing to the CEO within seven days of the exceedance being identified; (2) implement the management and/or contingency actions specified in the Confirmed Surface Water Management Plan as required by condition **8-2(6)** within seven days of the exceedances being reported as required by condition **8-5(1)** or such lesser time specified in the Confirmed Surface Water Management Plan and continue implementation of those actions until the CEO has confirmed by notice in writing that it has been demonstrated that the threshold criteria are being met and implementation of the management and/or contingency actions are no longer required; (3) investigate to determine the cause of the threshold criteria being exceeded; (4) investigate to provide information for the CEO to determine potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded; (5) provide a further report to the CEO within twenty-one (21) days of the exceedance being reported as required by condition **8-5(1)** and such further report shall include: (a) details of management and/or contingency actions implemented; (b) the effectiveness of the management and/or contingency actions implemented against the threshold criteria; (c) the findings of the investigations required by conditions **8-5(3)** and **8-5(4)**; (d) measures to prevent the threshold criteria being exceeded in the future; (e) measures to prevent, control or abate the environmental harm which may have occurred; and (f) justification of the threshold criteria remaining, or being adjusted based on better understanding, demonstrating that outcomes will continue to be met	Section 2.4.4
8-6	Without limiting condition **8-4** (implementation of the plan) and notwithstanding compliance with condition **8-5** (response to exceedance), the proponent must not cause or allow: (1) a failure to implement one or more management actions, if the relevant threshold criteria has been met; (2) the exceedance of a threshold criteria (regardless of whether threshold contingency actions have been or are being implemented); and/or (3) failure to comply with the requirements of the Confirmed Surface Water	Section 2.4.5

	Management Plan.	
8-7	The proponent, in consultation with the Murujuga Aboriginal Corporation: (1) may review and revise the Confirmed Surface Water Management Plan and submit it to the CEO; and (2) shall review and revise the Confirmed Surface Water Management Plan and submit it to the CEO as and when directed by the CEO.	Section 0
7-1	The proponent shall undertake intrusive acid sulfate soils investigations in accordance with the requirements of the Department of Water and Environmental Regulation's guideline on the Identification and investigation of acid sulfate soils and acidic landscapes (DWER 2015) at least six months prior to Ground Disturbing Activities.	Section 1.2.1.5 & 2.2
7-2	In the event that acid sulfate soils are disturbed during the implementation of the proposal, the proponent shall treat and manage acid sulfate soils in accordance with the requirements of the Department of Water and Environmental Regulation's guideline on the treatment and management of soil and water in acid sulfate soil landscapes (DWER, 2015).	Section 1.2.1.5 & 2.2

Appendix 2A – Environmental Risk Assessment & Process Matrix

Risk Assessment Process	Description	Methodology	Application						Reference Procedures	
			Corporate	Business Division	New Opportunity	Project Planning	Project Execution	Project Close-out		
Business Risk Assessment - HSSE Impacts	Identify, assess and control potential HSSE impacts of conducting Contractor business	Bow-tie							Risk Management Procedure	CORP-RA-PR-G-0001
Major Accident Event Hazard Assessment	Identify, assess and control Major Accident Events Hazards	MAE Bow-ties							MAE Hazard Management Procedure	CORP-HSE-PR-G-0068
Technical HSSE Assessments										
Design risks	Identify, assess and document inherent design risks	HAZID, HAZOP, FMEA							Safety in Design Procedure	CORP-ENG-PR-G-0016
Design reviews - construction, operation, maintenance	Identify, assess and mitigation of HSSE hazards introduced by the design when facility being constructed, operated or maintained	HAZID, HAZOP							Safety in Design Procedure	CORP-ENG-PR-G-0016
Human Factors analysis	Identify, assess and control potential ergonomic, health impacts of operation as part of design	Human Factors Analysis Study							Safety in Design Procedure	CORP-ENG-PR-G-0016
Fire & Explosion analysis	Identify, assess and control potential sources of fire & explosion, and consequence mitigation through design	Fire and Explosion Study							Safety in Design Procedure	CORP-ENG-PR-G-0016
Threat Specific HSSE Hazard Assessment (where applicable to Project)										

Risk Assessment Process	Description	Methodology	Application						Reference Procedures	
			Corporate	Business Division	New Opportunity	Project Planning	Project Execution	Project Close-out		
Health Risk Assessment	Identify, assess and mitigate health exposures - travel and site based	HRA							HSSE Risk Management Procedure	CORP-HSE-PR-G-0072
Environmental / Social Impact Assessment	Identify, assess and mitigate environment and community impacts	EIA, HAZID, Social Impact Study							HSSE Risk Management Procedure	CORP-HSE-PR-G-0072
Natural Disasters Assessment (Emergency Events)	Identify, assess and mitigate potential natural disaster events which may affect the site (e.g. cyclone, wild fire, tsunami)	HAZID							HSSE Risk Management Procedure	CORP-HSE-PR-G-0072
Task Based HSSE Hazard Assessment										
Project HSSE Assessment	Identify, assess and control potential HSSE impacts specific to the Project & Site	HAZID							HSSE Risk Management Procedure	CORP-HSE-PR-G-0072
Construction Package HSSE Assessment	Identify, assess and control potential HSSE impacts specific to the Construction package	HAZID							HSSE Risk Management Procedure	CORP-HSE-PR-G-0072
Subcontractor HSSE Assessment	Assess the HSSE capability of subcontractors to inform management strategy Identify, assess and control potential HSSE impacts of contract scope	PRE-QUAL / HAZID							HSSE Risk Management Procedure	CORP-HSE-PR-G-0072

Risk Assessment Process	Description	Methodology	Application						Reference Procedures	
			Corporate	Business Division	New Opportunity	Project Planning	Project Execution	Project Close-out		
Work Team Task Assessment	Work teams identify, assess and control HSSE hazards of planned work	JHA							HSSE Risk Management Procedure	CORP-HSE-PR-G-0072
Personal Task Assessment	Individuals identify, assess and control HSSE hazards of planned task	TAKE 5							HSSE Risk Management Procedure	CORP-HSE-PR-G-0072

HSE Risk Matrix

HSSE Consequence / Severity Table

Consequence	Health & Safety	Environmental Impact	Security	Business Risk	Financial impact	Murray & Roberts Injury Consequences
Catastrophic	Multiple fatalities, Multiple serious disabling injuries.	Release of pollutants capable of causing irreversible environmental harm requiring national / international resources for remediation.	One or more fatalities Terrorists attacks. Inability to conduct any business.	Company prosecuted. Loss of future work. Project shutdown. Violation of Company policy. Widespread dissatisfaction resulting in legal action.	>$30 Million	**Critical (Level 5)** Fatal injury. Incident has the potential for more than one fatal injury.
Major	Single fatality, serious injury resulting in permanent disability. Multiple injured parties.	Release of pollutants to sensitive areas; Immediate off-site contamination requiring state / regional external resource for remediation. Long term impact (6-12 months)	Deliberate attacks on staff and family resulting in severe injuries. Kidnapping. Severe delays to business operations. Rape.	Adverse national media coverage. Significant reduction in customer satisfaction. Threat to project success with potential for legal action.	$10M - $30M	
Moderate	Lost Time Injury Restricted Duties Injuries Injury reportable to Regulatory body	Environmental harm reportable to Government authority. Breach of licence conditions / lease. Onsite contamination with the potential to cause offsite contamination. Medium term impact (1-6 months)	Threat and intimidation of staff. Assault resulting in minor/no injury. Theft/vandalism/ sabotage of equipment that cannot easily be replaced. Short delays or interruptions to operations.	Local media coverage. Failure causing customer dissatisfaction with moderate delay, rework or extra work requiring additional resource. Client forced to impose penalties.	$2M - $10M	**Major (Level 4)** Incident has the potential for fatal injury **Serious (Level 3)** Lost time injuries. Incident has the potential for permanent disablement.
Minor	Medical Treatment	Minor onsite pollution not within confines of protected area. No long term impact. Clean up within 1 month.	Crime with minimal impact. Theft / Vandalism of nuisance value only. No lasting impact on business operations	Telephone or written complaints. Failure causing slight customer concern and inconvenience, resolved with current levels of resource.	$50K – $2M	**Minor (Level 2)** Medical treatment injuries
Insignificant	First Aid Treatment No treatment required	Localised / Contained impact / Immediate complete fix	Insignificant crime Theft of insignificance. No impact on business operations.	Minimal or no impact to project delivery.	Less than $50K	**Low (Level 1)** First aid treatment injuries

Probability

Probability	Description
Almost Certain	This event is expected to occur or is known to have occurred frequently at Clough in similar situations.
Likely	This event may occur or is known to have occurred at Clough in similar circumstances.
Possible	This event might occur or is known to have occurred at Clough in additional circumstances.
Unlikely	This event could occur or is known to have occurred in the industry but not at Clough.
Rare	This event may only occur in exceptional circumstances or is not known to have occurred in the industry.

HSSE Risk Matrix

Descriptor		Actual / Potential Consequence				
		Insignificant (5)	Minor (4)	Moderate (3)	Major (2)	Catastrophic (1)
Probability	Has Occurred /Almost Certain	9	16	18	23	25
	Likely	4	11	17	20	24
	Possible	3	10	13	19	22
	Unlikely	2	6	12	14	21
	Rare	1	5	7	8	15

Key			HSSE Risk Response Guide
Risk Level	Rating Range		
Low	1	8	Confirm no further control measures are required to demonstrate the risk ALARP. Responsible Supervisor to ensure all identified control measures are in place prior to the work progressing.
Moderate	9	15	Action is required to identify control measures to reduce the risk to ALARP. Work can only progress at this risk level with approval of Project Management.
High	16	22	Immediate action is required to identify control measures to reduce the risk to ALARP. Risk must be added to Project Risk Register for monitoring. Work can only progress at this risk level with approval of the Project Manager or Clough Senior Management.
Very High	23	25	This denotes unacceptable event or level of risk. Immediate action is required to identify control measures to reduce the risk to ALARP. Risk must be added to Project Risk Register for monitoring.

*The HSSE Risk Matrix and Guidelines DO NOT replace the requirements for risk assessment and treatment carried out in accordance with the Risk Management and Assurance Operating Standard (CORP-RA-OS-G-0003) and should only be used when performing HSSE Risk Assessment at a Project Level.

**The HSSE Risk Matrix shall be used to determine the level and timing of incident notification, classification and investigation. Events rated 19 or above (highlighted by shading and bold border) are considered High Potential Incidents and shall be reported accordingly.

Appendix 2B – Surface Water Risks & Mitigation

Table 3B - Surface Water Risk Assessment

Potential Impact	Mitigation Measures	Likelihood	Consequence	Residual Risk
OBJECTIVE: - To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.				
Pollution • Potential for spills or leaks to contaminate the surrounding surface water values within and surrounding the site. • Pollution Impacts to the supratidal zones (Hearson Cove and King Bay) during the construction of the proposed causeway between sites F and C. • Potential impacts to the mangrove communities at King Bay where spills and contaminants are delivered to the supratidal to intertidal areas. • Stormwater or wastewater Run-off from access tracks, laydown and hardstand areas have the potential to contaminate the surrounding surface water values when runoff is delivered to the supratidal to intertidal areas.	• Supply and construct mechanisms to avoid/mitigate potential spills or discharge as detailed in **the Erosion, Sediment and Surface Water Management Protocol.** • Further controls pertinent to spills and leaks to be implemented as per the **Hydrocarbons and Hazardous Substances Management Protocol**. • Environmental Inspections as per Section 2.3 of this Plan to ensure the integrity of storage facilities and the proper storage requirements are being adhered to. • Storage of chemicals and hazardous substances shall not be permitted on the supratidal areas or other areas prone to flooding or drainage / runoff. • Obtain an **EP Act 1986 - Part V** - Works Approval & Licence - Cat 73. Chemical storage. • Construction of the causeway will be conducted in the shortest time frame allowable to minimise impacts to the supratidal flats. • All surface water discharges on site shall be diverted to a purpose-built facility to treat (if required) and be appropriately contained by implementing Management Action 2 (see Table 2-2). • Where possible, permanent infrastructure and laydown areas will avoid the higher, steeper areas along the southern boundary of the development envelope. • Run-off will be diverted into appropriate storage units; implemented and managed in accordance with this Plan. • Ensure compliance with Condition requirements within Condition 8 of MS 1180 through implementing the requirements outlined in this **Surface Water Management Plan** (PCF-PD-EN-SWMP-PCF2). • An Erosion Sediment Control Plan will be developed as part of the GDP process when constructing access tracks, laydown and hardstand areas and disturbing the ground to minimise potential for contaminated run-off from these areas to enter the surrounding environment. • Environmental Inspections as per Section 2.3 of this Plan to ensure ESCs are in place and are working and altered drainage has not impacted surrounding surface	Unlikely	Major	14

Potential Impact	Mitigation Measures	Likelihood	Consequence	Residual Risk
OBJECTIVE: - To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.				
	water values. • Pollution caused by site activities will be avoided through appropriate containment, diversion and treatment of surface water run-off.			
Sedimentation • Run-off from stockpiles may cause sedimentation and deposition of foreign/ /contaminated material into the environment. • Alteration of watercourses may cause sedimentation and deposition resulting in problematic diversion of surface water flows. • Sedimentation in the hold ponds may impede water quality standards and compromise eligibility for discharge via the MUBRL.	• Stockpiles to be managed in accordance with the Erosion, Sediment and Surface Water Management Protocol. • Comply with requirements outlined in the **Surface Water Management Plan** (PCF-PD-EN-SWMP-PCF2). • Material Tracking System implemented during construction. • GPS utilised to track and record locations of stockpiles and type of material. • Ensure ESCs are implemented around stockpiles to limit contaminated run-off. • Stockpile contaminated topsoil's (i.e. from weeds, ASS, spills) separately from clean fill or topsoil. • Ensure Stockpiles are labelled / signposted. • Training and awareness conducted onsite. • Prepare stockpiles prior to rainfall or potential flood events. • Environmental Team to inspect stockpiles regularly as per Section 2.2 of this Plan. • Obtain relevant licencing under the **Rights in Water and Irrigation Act 1914** (RIWI 1914). • Detail stockpiling procedures in the GDP. • An Erosion Sediment Control Plan will be developed as part of the GDP process when conducting ground disturbing activities. • Environmental Team to inspect ground disturbing activities regularly as per Section 2 of this Plan. • Sediment basins are to be provided for hold ponds so that suspended particles may settle out of the water column prior to MUBRL discharge and will be inspected weekly to ensure sediment basins do not exceed 30% capacity.	Unlikely	Moderate	12

Potential Impact	Mitigation Measures	Likelihood	Consequence	Residual Risk
OBJECTIVE: - To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.				
Construction and operations of the concrete batching plant. • Stormwater or wastewater run-off from the concrete batching site have the potential to contaminate the surrounding surface water environment. • Sediment laden/alkaline water entering surrounding stormwater / drainage onsite and exiting site. • Alkaline washout impacting soil chemistry/ groundwater and associated nearby receptors. • Fines and penalties associated with Schedule 1 substances being discharged (Environmental Protection [Unauthorised Discharges] Regulations 2004).	• Ensure the Construction and operations of the Concrete Batching Plant is in accordance with approval and license conditions (Part V) for Cat 77 (TBC – awaiting DWER). • Implement conditions in PART V approvals. • Develop and implement a ESCP for the Concrete Batching Plant. • Implement Concrete Batching Management Protocol. • Regular Environmental Inspections as per Section 2.3 of this Plan. • Implement the Erosion, Sediment and Surface Water Management Protocol. • Prepare the Concrete Batching Plant Management Protocol which will specifically manage the emissions and discharges likely from the batching plant and include relevant conditions issued through the DWER approval and license (Part V) • Waste disposal as per the Solid and Liquid Wastes Management Protocol and the Hydrocarbons and Hazardous Substances Protocol. • Obtain Works approval and Licensing under Part V of the EP Act for concrete batch plant construction and operations – Cat 77.	Unlikely	Major	14
Excavations Exposing ASS • Disturbance of Acid Sulfate Soils. • Potential to cause significant environmental and economic impacts including fish kills and	• Determine risks of ASS / PASS prior to conducting excavations. • Cut and Fill activities will not be carried out in the causeway between sites F and C (shown in Figure 1-7 to be high risk of ASS). Refer to Appendix 3 for Cut and Fill locations against the ASS risk areas (Coffey, 2022). • Identify, manage and treat ASS in line with the DWER 2015 Guidelines. • Causeway design to be applied will avoid need to dewater or excavate ASS soils.	Unlikely	Major	14

Potential Impact	Mitigation Measures	Likelihood	Consequence	Residual Risk
OBJECTIVE: - To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.				
loss of biodiversity in waterways. • Contamination of groundwater by mobilisation of acids, arsenic, heavy metals and other contaminants and corrosion of concrete and steel infrastructure by acidic soil and water. •	• The base of the causeway will be approximately 2 mAHD which is existing ground surface level within the supratidal and intertidal zone. Approximate three meters of sand bedding will be applied above this level with concrete culverts embedded within sand to permit the flow of stormwater from east to west across the supratidal and intertidal areas of the Site. A compacted fill layer 1.7 m thick will then be placed on top of the sand bedding layer to provide a base for final causeway road layers such as crushed aggregate and asphalt. Fill material will be used primarily on top of sand bedding to stabilise the causeway surface before final layers such as crushed aggregate, granular materials and asphalt are applied. The finished grade will be 6.15 mAHD. • Where previously unknown areas of ASS are identified during the construction works, works must cease immediately, and the environmental team shall be present to identify the presence of ASS. • Visual identification can be conducted and Field sampling and supporting Laboratory analysis (NATA accredited Laboratory) will likely be required to confirm visual and olfactory indications. • All analysis must be conducted at a NATA accredited Lab. • Where treatment is required, a containment and treatment facility (treatment pad) will be developed onsite. Management will be in accordance with the Management Actions in Table 2-2 and in accordance with DWER 2015 Guidelines. • Implement controls pertaining to the **Acid Sulfate Soils Management Protocol** and the Management Actions for treatment of ASS and PASS in Table 2-2 of this Plan. • Regular Environmental Inspections as per Section 2.3 of this Plan. • Obtain the following licenses: o Licences to take water under s 5C of the RIWI Act. o Licences to construct or alter a well under s 26D of the RIWI Act.			

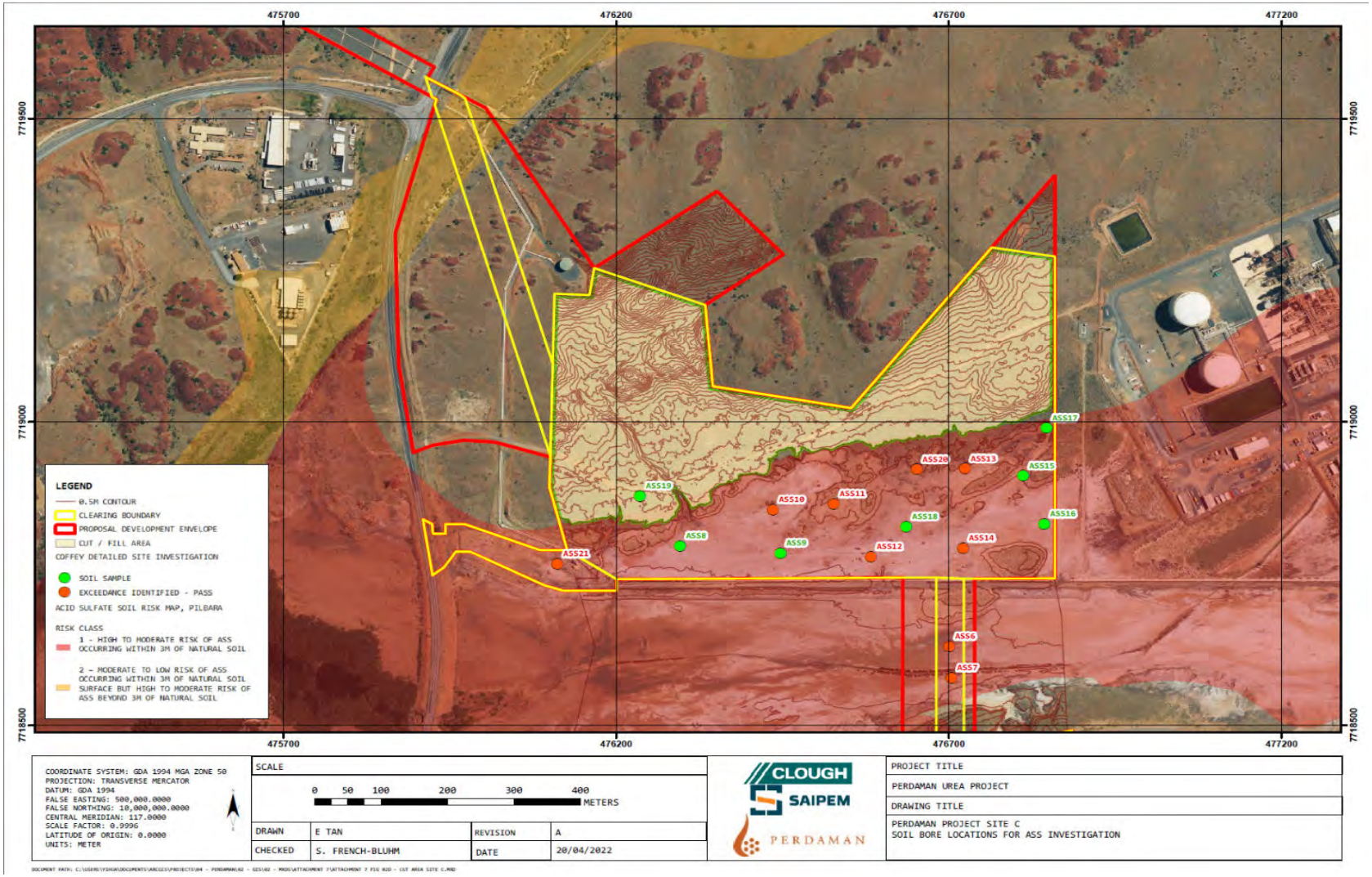
Potential Impact	Mitigation Measures	Likelihood	Consequence	Residual Risk
OBJECTIVE: - To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.				
Dewatering • Potential to release toxic metals and arsenic into the environment due to the disturbance of acid sulfate soils. • Lowering of the standing water table in water supply bores. • Changes to groundwater levels and quality.	• Prior to ground disturbing activities, a Hydrogeological assessment / study will be conducted to determine the presence of ASS and assess the need for dewatering. • Management of ASS shall be in accordance with the DWER Guidelines 2015 and Condition 7-2 of MS 1180. • Implement design and construction methodology to eliminate the requirement for dewatering during construction activities. • The construction of the causeway connecting Sites C and F across the supratidal flats shall be built on grade and will not require the need to excavate or dewater. • EPC will comply with requirements within Condition 6 of MS 1180 pertaining to Hydrogeological studies, monitoring and management. • Regular Environmental Inspections as per Section 2.3 of this Plan. • Hydrogeological Studies (Coffey 2022b) confirmed there will be no dewatering required during construction. Where dewatering becomes a requirement during construction or operations (throughout the implementation of the Project), further assessment and a dewatering management plan will be prepared and implemented. • Works that will be avoided in areas prone to PASS/ASS include construction of drains that lower the groundwater table, uncontrolled groundwater extraction and drawdown from groundwater bores during construction or operations. • No uncontrolled or unauthorised dewatering in excavations. • No unauthorised re-injection into surrounding aquifers. • Implement the groundwater and surface water monitoring programs (section 2.3 of the SWMP). • Obtain the following licenses if dewatering is required: o Licences to take water under s 5C of the RIWI Act. o Licences to construct or alter a well under s 26D of the RIWI Act.	Unlikely	Major	14

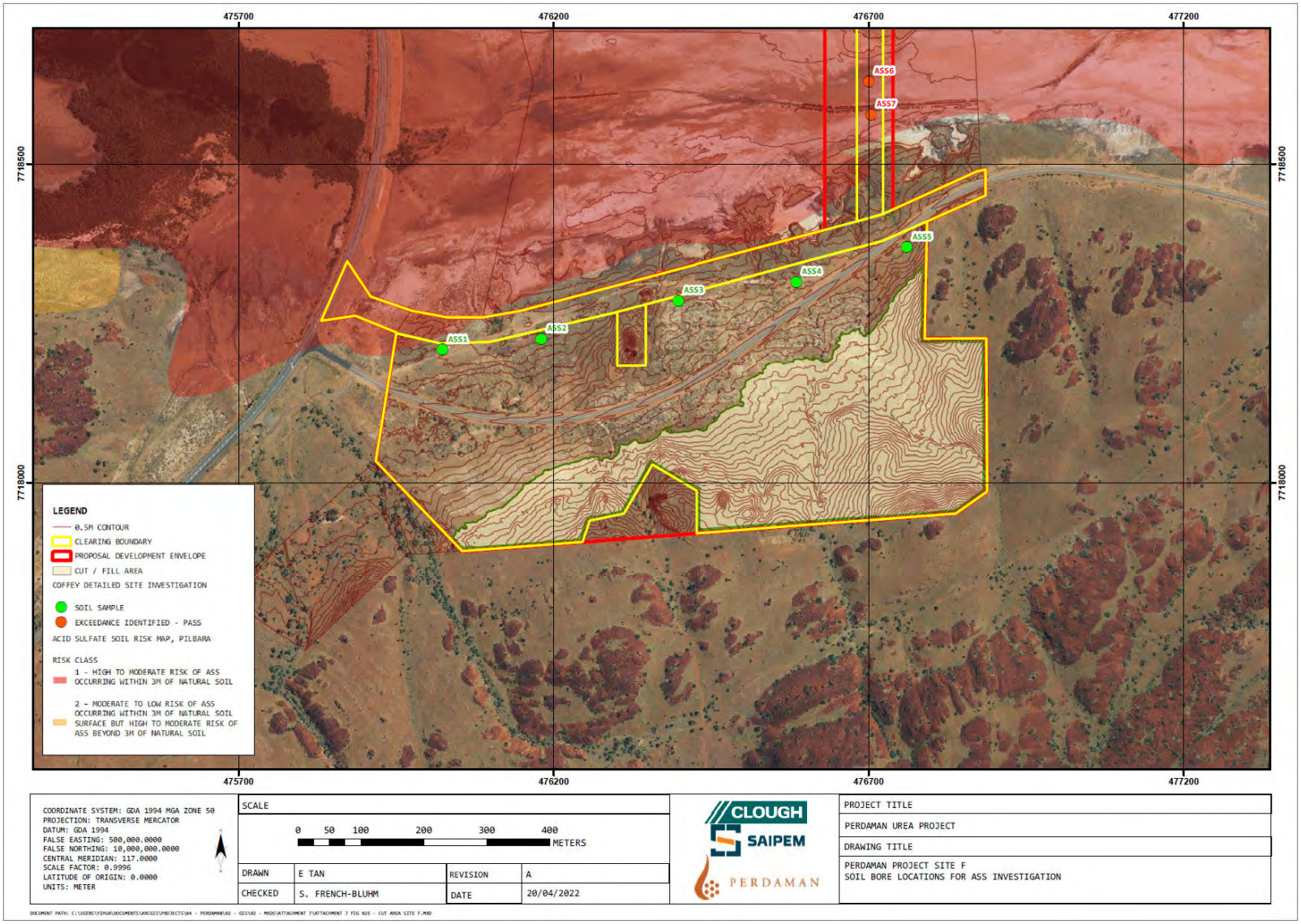
Potential Impact	Mitigation Measures	Likelihood	Consequence	Residual Risk
OBJECTIVE: - To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.				
Construction of the Causeway • Development of the causeway between sites C and F may impact samphire shrublands, the supratidal flats and the King Bay mangrove community adjacent the supratidal flats in the following ways: • Obstruction of tidal flows. • Sedimentation. • Pollution.	• Causeway construction works will be completed over the shortest time practicable to minimise the period of environmental disturbance in the saline coastal flat. • Rehabilitation of all temporary work areas will involve reinstatement of surface flow patterns through removal of any temporary causeways required for construction, restoration of the pre-existing contours and revegetation. • The base of the causeway will be approximately 2 mAHD which is existing ground surface level within the supratidal and intertidal zone. Approximate three meters of sand bedding will be applied above this level with concrete culverts embedded within sand to permit the flow of stormwater from east to west across the supratidal and intertidal areas of the Site. A compacted fill layer 1.7 m thick will then be placed on top of the sand bedding layer to provide a base for final causeway road layers such as crushed aggregate and asphalt. Fill material will be used primarily on top of sand bedding to stabilise the causeway surface before final layers such as crushed aggregate, granular materials and asphalt are applied. The finished grade will be 6.15 mAHD. • Design causeway to ensure minimal restriction to existing flow rates across the flood plain (culvert outflow velocity not to exceed 1m/s as per Condition 1 of MS 1180). • Comply with requirements outlined in the **Surface Water Management Plan** (PCF-PD-EN-SWMP-PCF2). • Supply and construct mechanisms to avoid/mitigate potential spills or discharge as detailed in the CEMP **Erosion, Sediment and Surface Water Management Protocol.** • Further controls pertinent to spills and leaks to be implemented as per the CEMP **Hydrocarbons and Hazardous Substances Management Protocol.**	Unlikely	Major	14

Potential Impact	Mitigation Measures	Likelihood	Consequence	Residual Risk
OBJECTIVE: - To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.				
Flooding • Due to the impacts by cyclones, and the forecast of a 1 in 100 year storm event likely to occur during the life of the Project, operational integrity must withstand winds and high volumes of rain. • Flooding events may cause overflow of hold ponds and diversion streams, causing potentially contaminated waters to spill into the environment.	• Containment bunds around facilities such as vehicle servicing facilities, chemical / fuel storage areas and concrete batch plants will be designed to minimise flood water entry and be inspected on a regular basis. • Monitor water levels through observation of flood prone areas associated with the Project and by checking local media, emergency services and the Bureau of Meteorology website for flood and storm surge advice. • If flooding is likely, prepare flood prone areas (as detailed in the Emergency Response Management Plan CW1055600-EN-PL-004) early, ensuring vehicles and equipment are removed. • Prepare stockpiles prior to rainfall or potential flood events. • Basins shall be designed relative to the catchment and likely flow levels for higher rainfall events. • Stormwater infrastructure designed in accordance with the 'Major/Minor' approach outlined in Australian Rainfall and Runoff and AUSTROADS Waterway Design Guidelines. • Adopt the guidance from DWER Water Quality Protection Note 52: Stormwater Management at Industrial Sites. • Minimise the impact of flooding on structures and as a general principal, for storms of 1 in 20 year ARI or less, the post-development flows should meet pre-development flows off the project site, • With respect to environmental flows, to prevent erosion, scouring and sedimentation in natural or unlined channels velocities of frequent/regular storm flows (1 in 5 year ARI storms) should be limited to velocities of less than 0.8 m/sec. • Major storms of up to 1 in 100 year ARI storm and up to 24 hour duration should be stored and treated on the plant site and recycled, all storms of a greater duration will be released in a controlled fashion through spillways. • Within the PPA the design and construction of stormwater/drainage infrastructure will be to MRWA standards. • On-site and off-site stormwater management will minimise the export of pollutants from the site and adopt the following stormwater quality improvement targets as compared to untreated stormwater:	Unlikely	Major	14

Potential Impact	Mitigation Measures	Likelihood	Consequence	Residual Risk
OBJECTIVE: - To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.				
	• Eighty percent (80%) reduction in Total Suspended Solids • Ninety (90%) reduction in Gross Pollutants			
RE-use of Material (ASS/PASS material, Hydrocarbons).	• Undertake intrusive ASS Investigations, including laboratory sampling and testing. • Contamination risk assessments to be conducted for each work area upon design finalisation and construction methodology being adopted. • Reuse of contaminated materials (ASS, Hydrocarbon etc) will not be reused unless treatment and remediation of soils. • Materials deemed contaminated will be separately stockpiled and labelled. • Reuse materials will be separated and labelled. • All materials will be included within the MTS. • Verification of soil status prior to reuse shall be sort. (i.e. through documentation, MTS and Laboratory reports).	Unlikely	Major	14

Appendix 3 – Cut & Fill Locations and ASS Risk Areas



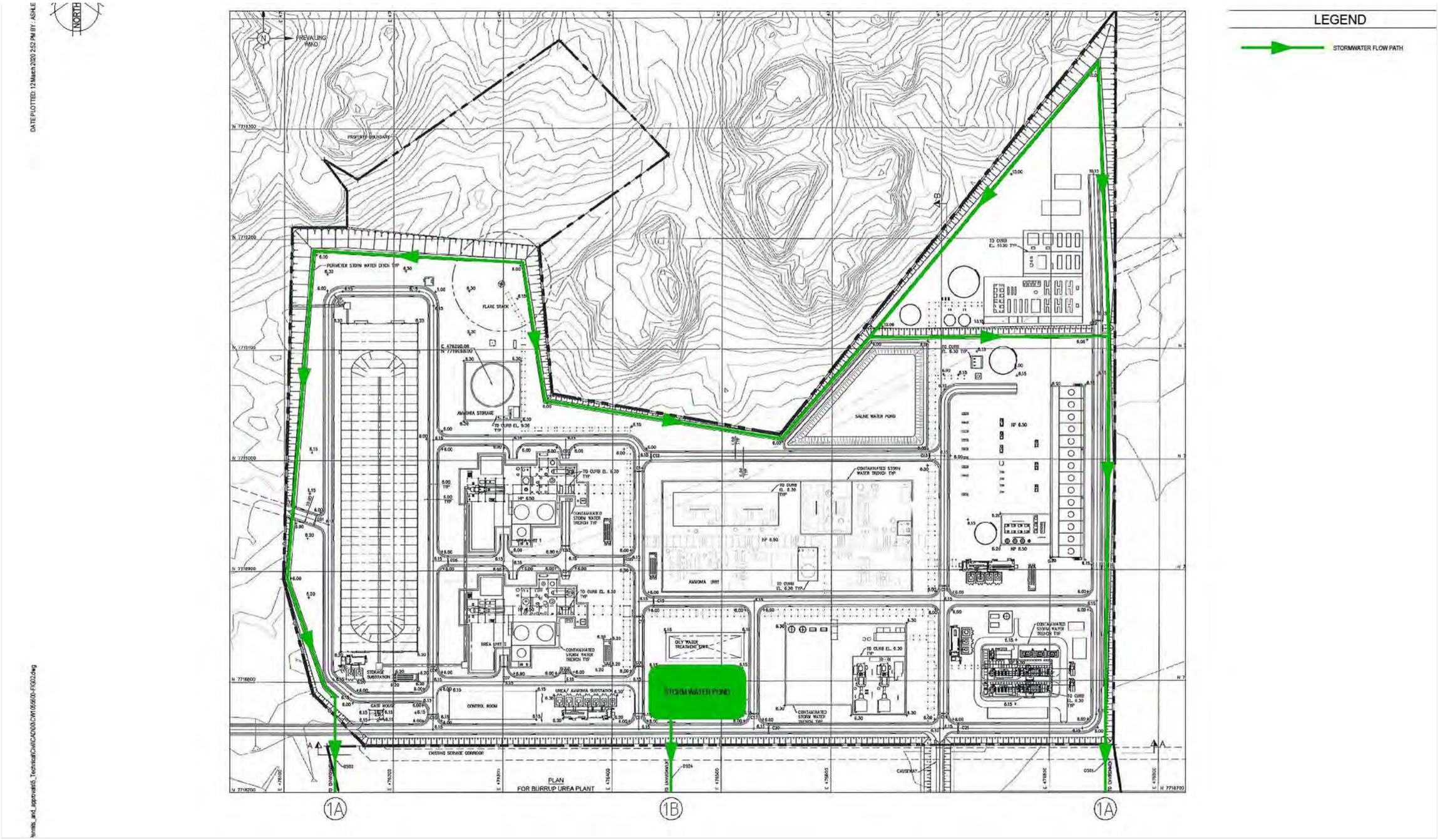

475700
476200
476700
477200
7718500
7718000
ASS1
ASS2
ASS3
ASS4
ASS5
ASS6
ASS7
LEGEND
0.5M CONTOUR
CLEARING BOUNDARY
PROPOSAL DEVELOPMENT ENVELOPE
CUT / FILL AREA
COFFEY DETAILED SITE INVESTIGATION
SOIL SAMPLE
EXCEEDANCE IDENTIFIED - PASS
ACID SULFATE SOIL RISK MAP, PILBARA
RISK CLASS
1 - HIGH TO MODERATE RISK OF ASS OCCURRING WITHIN 3M OF NATURAL SOIL
2 - MODERATE TO LOW RISK OF ASS OCCURRING WITHIN 3M OF NATURAL SOIL SURFACE BUT HIGH TO MODERATE RISK OF ASS BEYOND 3M OF NATURAL SOIL
COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
FALSE EASTING: 500,000.0000
FALSE NORTHING: 10,000,000.0000
CENTRAL MERIDIAN: 117.0000
SCALE FACTOR: 0.9996
LATITUDE OF ORIGIN: 0.0000
UNITS: METER
SCALE
0 50 100 200 300 400
METERS
DRAWN
E TAN
REVISION
A
CHECKED
S. FRENCH-BLUHM
DATE
20/04/2022
CLOUGH
SAIPEM
PERDAMAN
PROJECT TITLE
PERDAMAN UREA PROJECT
DRAWING TITLE
PERDAMAN PROJECT SITE F
SOIL BORE LOCATIONS FOR ASS INVESTIGATION

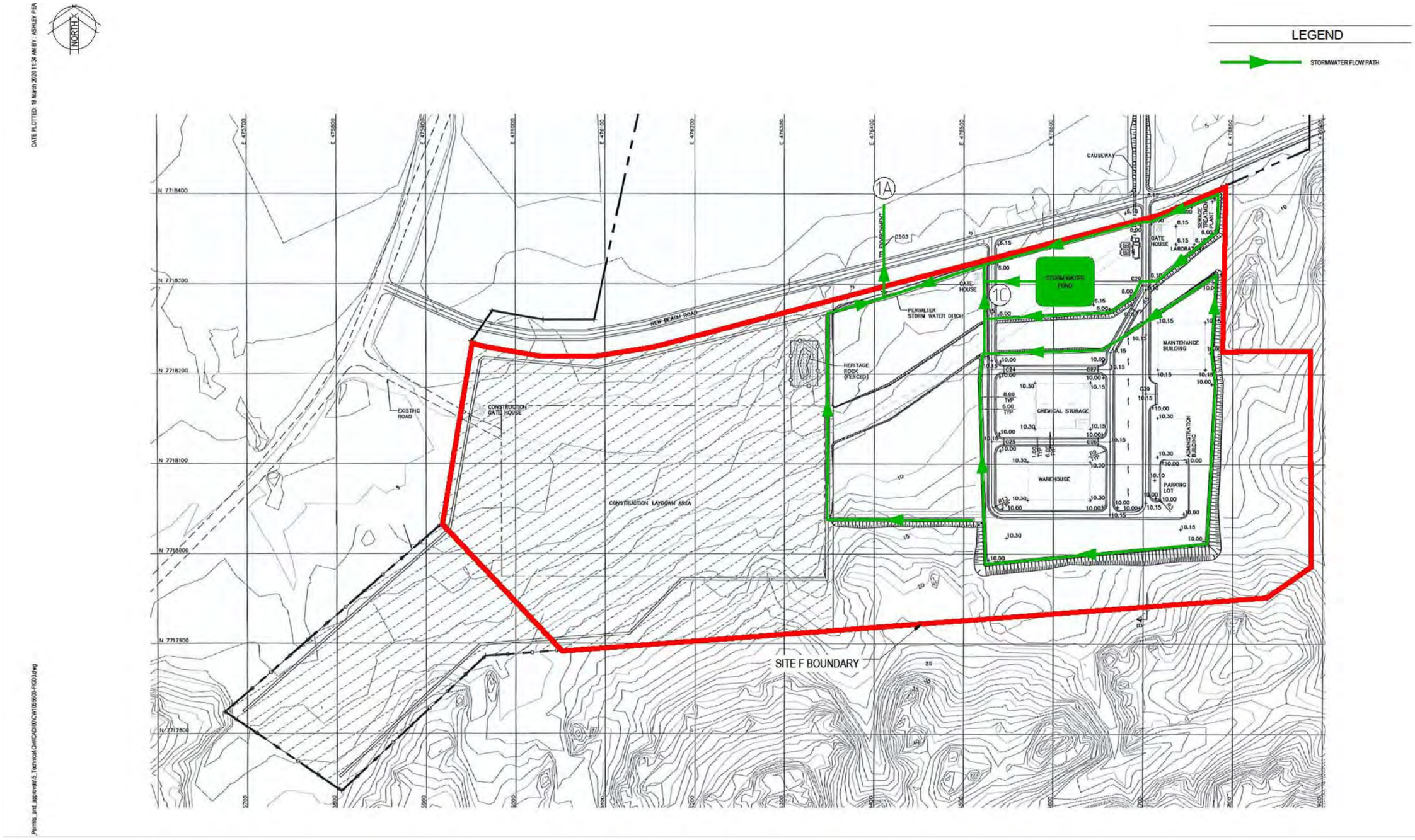
Appendix 4 – Groundwater Level (Baseline)

Table 0-1 - Source: Coffey Report 2022b: Groundwater Level and Monitoring Well Information

Well ID	Date Gauged	Easting (MGA 94 Zone 51)	Northing (MGA 94 Zone 51)	Ground RL (mAHD)	Casing RL (mAHD)	Depth to Water (mbtoc)	Groundwater Elevation (mAHD)
BH12	08/02/2022	476762.865	7718885.787	2.456	3.229	1.145	2.084
BH22	08/02/2022	476812.383	7719316.829	12.996	13.701	10.955	2.746
BH27	08/02/2022	476360.159	7718797.480	2.092	2.686	0.86	1.826
BH31	08/02/2022	476494.894	7718176.630	9.283	9.921	8.37	1.551
MW01	08/02/2022	476228.470	7719009.571	7.079	7.923	7.89	0.033
MW02	08/02/2022	476519.248	7718812.931	2.151	2.766	0.815	1.951
MW03	08/02/2022	476831.778	7718835.973	2.225	2.690	0.55	2.14
MW04	08/02/2022	476605.629	7717994.051	15.830	16.588	21.61	5.022
MW05	08/02/2022	476759.793	7718336.059	8.292	9.209	7.625	1.584
MW06	08/02/2022	476090.716	7718035.353	6.918	7.851	6.505	1.346
MW07	08/02/2022	476709.268	7718666.274	1.929	2.813	0.915	1.898
MW08	08/02/2022	476712.205	7718582.203	1.979	2.904	1.13	1.774
MW09	08/02/2022	476232.717	7718764.131	1.987	2.442	0.41	2.032
MW10	08/02/2022	476812.205	7718959.099	2.725	3.224	1.01	2.214

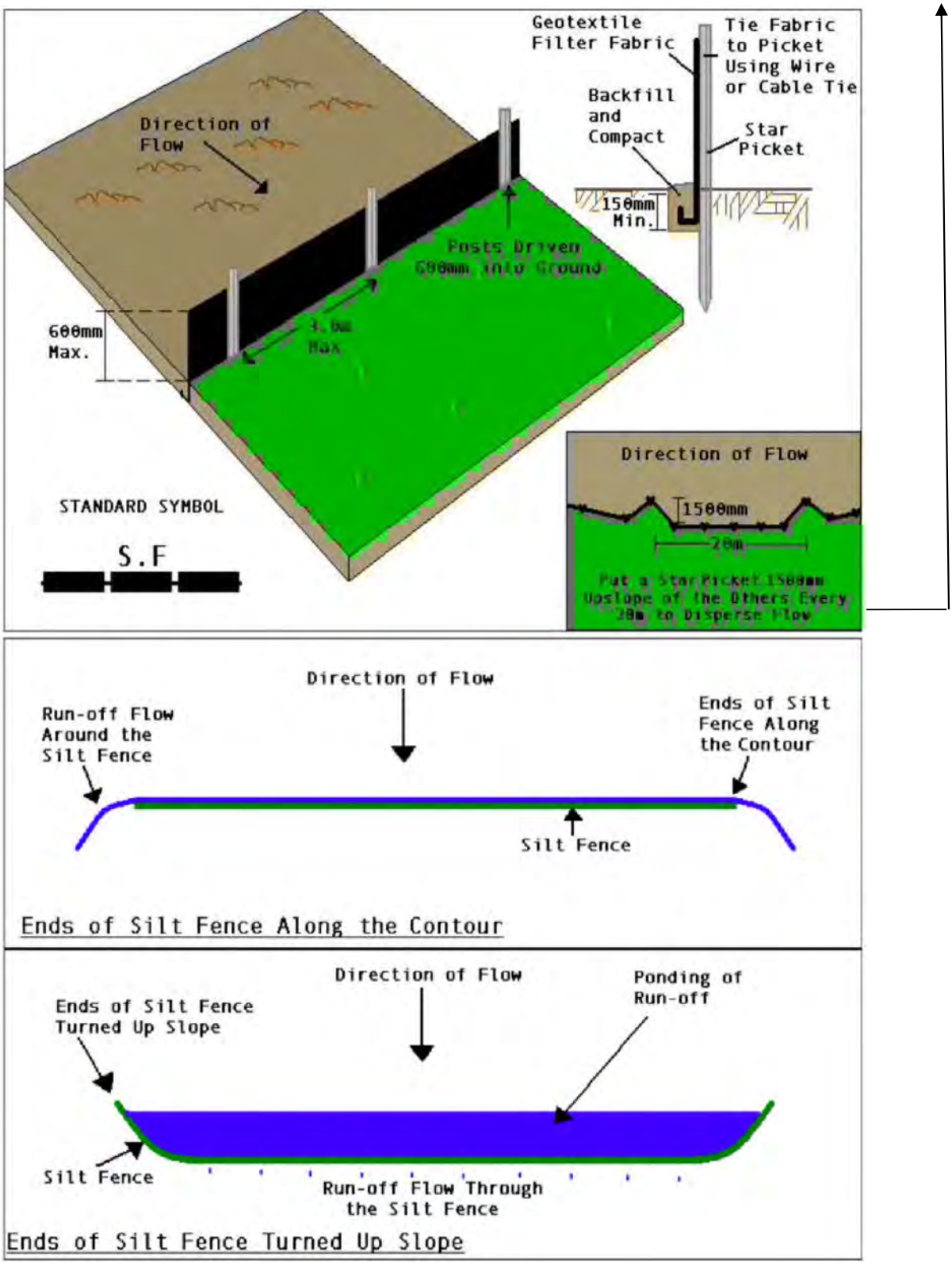
Attachment A. Project Surface Water Schematic and Plot Plans




LEGEND
STORMWATER FLOW PATH
NORTH
DATE PLOTTED: 18 March 2020 11:34 AM BY : ASHLEY PEA
CAUSEWAY
NEW BEACH ROAD
STORM WATER POND
GATE HOUSE
PERIMETER STORM WATER DITCH
HERITAGE ROCK (FENCED)
CONSTRUCTION GATE HOUSE
EXISTING ROAD
CONSTRUCTION LAYDOWN AREA
MAINTENANCE BUILDING
CHEMICAL STORAGE
WAREHOUSE
PARKING LOT
ADMINISTRATION BUILDING
SEWAGE TREATMENT PLANT
SITE F BOUNDARY

Attachment B. Silt Fence Design

'Put a star picket 1500mm upslope of the others every 20m to disperse flow.'



Attachment C. 140436-0000-4GER-0001 – Geotechnical Desktop Study

Attachment C. Geotechnical Desktop Study

Perdaman Project Destiny

GEOTECHNICAL DESK-TOP STUDY

Document No: **140436-0000-4GER-0001**

1 OF 6

Revision **: B1** Date **: 8-APR-2019**

B1	8 Apr 2019	Issued for Information	M. LEE & T.PERRIMENT	S.J.MOORE	N/A	EC
A1	29 Mar 2019	Draft for internal review	M. LEE & T.PERRIMENT	S.J.MOORE	N/A	EC
REV	**DATE**	**ISSUE DESCRIPTION**	**AUTHOR**	**CHECKER**	**HSSE/Q**	**APPROVER**

PERDAMAN INDUSTRIES
CHEMICALS & FERTILISERS

FOREWORD

CLARIFICATION OF PROJECT AREA

Some technical reports, including this one, were completed in the early planning and design phases of the Project. As such, some of the maps / and aerial views depict the following anomalies associated with the actual Project area:

i. The Project boundary of Site F does not have an extension from the south west corner.

ii. The southern alignment of Hearson Cove Road is not applicable. Only the alignment on the north side of Site F will apply to the Project.

iii. The footprint of the port area is limited to the area depicting the *Storage Shed – Port* and *Shiploader – Feed Conveyor.* It does not extend out along the Bulk Liquids Berth Jetty.

Figures A and B below provides further clarification of this discrepancy.

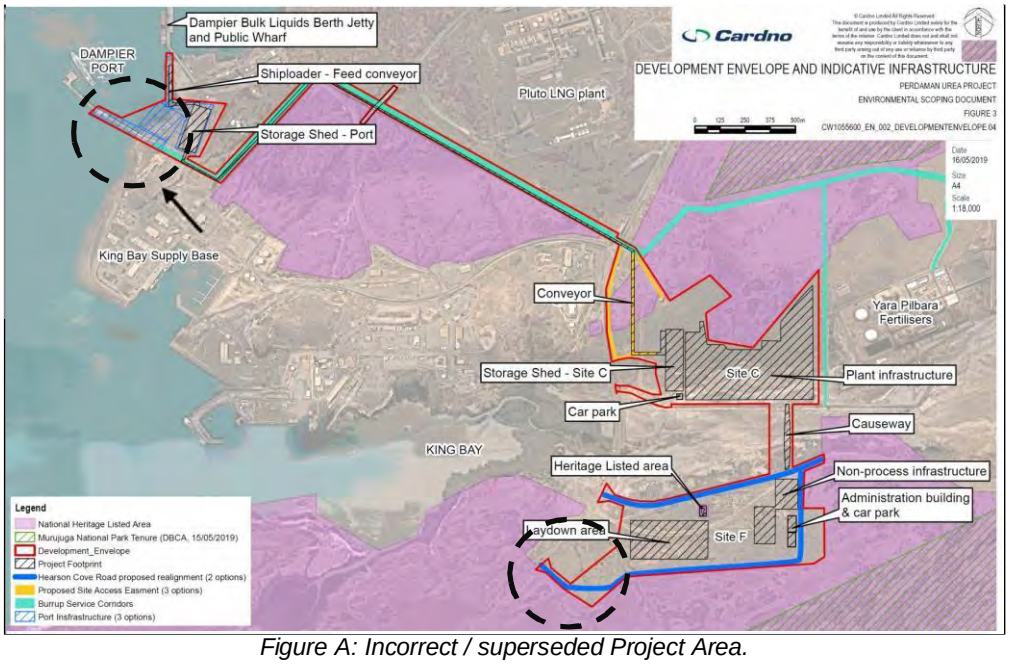


Figure A: Incorrect / superseded Project Area.

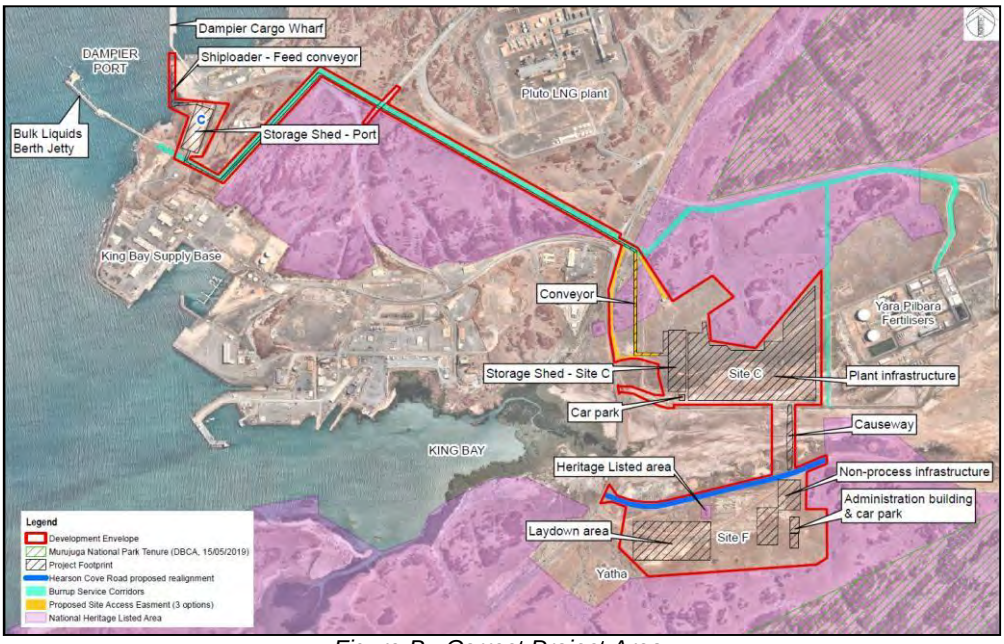


Figure B: Correct Project Area.

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1.0 INTRODUCTION

Perdaman Group (Owner) is seeking to develop a gas based urea plant located on the Burrup Peninsula, approximately 10km from Dampier and 20km north-west of Karratha on the north-west coastline of Western Australia. The Project's urea plant will be developed on Site C and F with a causeway linking between the two sites, which allow for the existing natural channel for the inter-tidal flow of seawater to remain relatively unchanged. In addition, the Project will also leverage the existing pipeline easement for the construction of a new conveyor corridor linking between the urea plant and the port. A new warehouse structure will constructed at the disused quarry of the port area.

1.1 Purpose

The desktop study has been undertaken for the purpose of informing the geotechnical design of the Project. The intention of the desktop study is to provide an initial indication of the potential geotechnical risk and requirements of the development as well as inform the gaps in the geotechnical analysis in previous investigation at or near the site. The work presented herein does not represent a design and any recommendation are indicative and further assessment Ground Investigation shall be undertaken prior to detailed design.

The desktop study will specifically:

- Provide a description of the site history, ground conditions, and environmental setting;
- Develop a preliminary conceptual site model (CSM);
- Identify ground related risks associated with the development; and
- Provide recommendations in relation to design aspects.

1.2 Scope

The scope of this desktop study is to provide a review of the existing available relevant information. Data sources to be examine should include as a minimum:

- Geology and Soil Maps;
- Acid sulfate soils maps;
- Any existing geotechnical reports that may be made available by the client;
- Council held records;
- Aerial photographic imagery; and
- Any nearby wellbore information.

2.0 SOURCES OF INFORMATION

Table 2-1 presents the information sources used to inform this desktop study report.

Table 2-1 - Sources of information

Class of Information	Data Obtained	Source
Memorandum	Cut and Fill Methodology	Woolnough, W. Memo to Benjamin Rankin SLI Engineering Manager. SNC-Lavalin, Toronto Ontario, Canada. 6 February 2019.
Report	Site History Geology Acid Sulphate Soils Groundwater	HLA Envirosciences Pty Limited. 1999. *Proposed Gas to Synthetic Hydrocarbon Plan Burrup Peninsula, Western Australia – Consultative Environmental Review.* GHD. 2010. *Dampier Nitrogen Pty Ltd – Ammonium Nitrate Project Public Environmental Review.* BHP Engineering. 1996. *Methanol Plant Site – Burrup Pensinsula Peliminary Geotechnical Design Criteria*. King Bay/ Hearson Cove and Maitland Industrial Estates, Phase 2 Geotechnical Investigation Report, by Soil and Rock Engineering, August 1999. Site Survey data provided by SNC-Lavalin, recorded March 2019.
Satellite Imagery	Historical Imagery	Google Earth. 2017. Google Earth Pro V 7.1.8.3036 (accessed on 26 March 2019) ESRI (2018-2019)
GIS Data Formats	Acid sulphate Maps Geological Maps Soil Maps Contours Hydrology	Government of Western Australia. 2018. Acid Sulfate Soil Risk Map, Pilbara Coastline (DWER-053).https://catalogue.data.wa.gov.au/dataset/acid-sulfate-soil-risk-map-pilbara-coastline-dwer-053/resource/f3fb78ab-0864-33ae-84ba- 840041c40153 (accessed on 26 March 2019) Government of Western Australia. 2000. 1:100 000 geological map – DAMPIER (2256), first edition. Geological Survey of Western Australia. Australian Government. 2011. 1 second SRTM Derived Hydrological Digital Elevation Model (DEM-H) Version 1.0. Geoscience Australia.

Laboratory Data Report	Historical Laboratory Data	King Bay/ Hearson Cove and Maitland Industrial Estates, Phase 2 Geotechnical Investigation Report, by Soil and Rock Engineering, August 1999.

3.0 SITE LOCATION AND DESCRIPTION

The Perdaman project is located on the Burrup Peninsula in northwest of Western Australia, approximately 1,300km north of Perth, with the nearest address being 314 Griffin Road, Dampier WA 6713. The coordinates for the approximate centre of site C is 476477E, 7718888N, and likely wise site F's coordinates are 476355E, 7718112N and the port area 473965E, 7720146N. The site is approximately 105 hectares in area and is relatively undeveloped with the exception of a few access roads running through the site. A site location map for the proposed development is presented as Figure 3-1 where the site boundary is outlined in red.

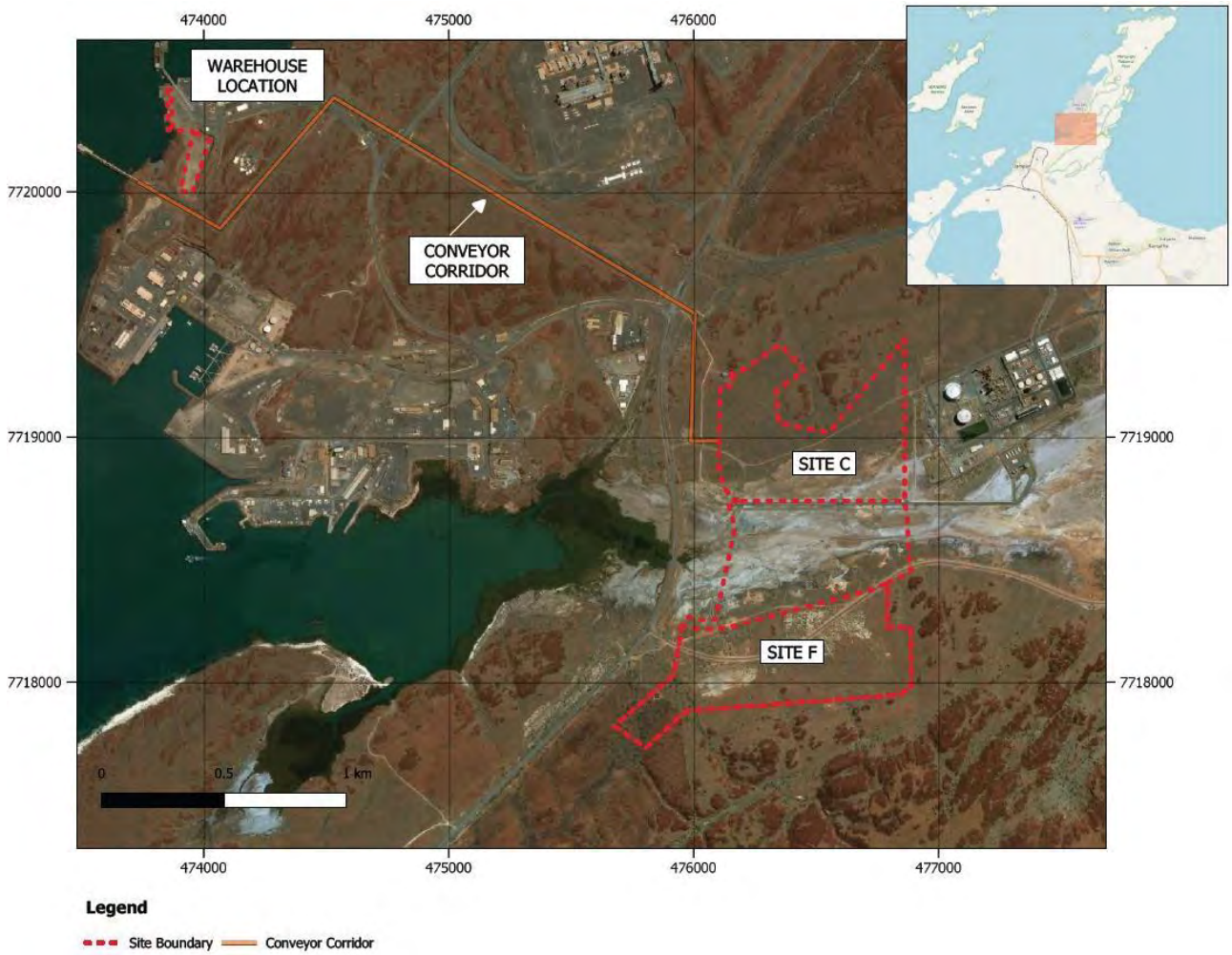


Figure 3-1 – Proposed site location plan with inset map showing location within the Burrup Peninsula, Western Australia

Site access to the following key infrastructure are:

- Site F: Hearson Cove Road, Burrup WA 6714 (runs throughout Site F);
- Site C: Unnamed Road off Burrup Road, Burrup WA 6714 (Towards Yara Pilbara Fertilisers); and
- Port Area: Mof Road, Burrup WA 6714.

4.0 DEVELOPMENT HISTORY

4.1 Historical Development

A review of the site history and surrounds has been carried out through the Google Earth imagery database and shows that the site has remained relatively unchanged since 2006.

Table 4-1 summarises the information obtained from reviewing the available historical images.

Table 4-1 – Historical development

Year	Site Description
Early 1980's	Site F was used for pipeline-weight coating operation, pipe laydown, concrete batching operations and stockpile of marine dredging spoils. Construction of a cement hardstanding using iron ore fines was required for the pipe weight coating yard (BHP Engineering, 1996).
1980 - 1990	Rehabilitation of the site which included import of fill material (potentially from Hearson Cove, course grained sand, shells and coral fragments) (BHP Engineering, 1996).
Early 1990's	Construction of new tourist road to Hearson Cove (BHP Engineering, 1996).
2006	Existing wharf facilities present approximately 3km west of the site. Existing Yara Pilbara Fertiliser plant to the east of the proposed Site C (construction began in 2003).
2009	No major changes.
2011	Development of Woodside Energy's Pluto LNG Park located approximately 1.5km northwest of Perdaman's proposed Site C.
2012	No major changes.
2013	No major changes.
2015	No major changes.
2017	No major changes.
2018	No major changes.

4.2 Previous Investigations

Previous ground investigation conducted at or nearby the site includes:

Reference	Details
Borrow Areas Selected for Road Construction for Main Access Road Northwest Shelf Development Project, Phase 2 Geotechnical Ground Investigation Report; Soil and Rock Engineering; August – September, 1980.	Report is referenced in BHP (1996) but was unavailable at the time of this review. 86 No. test pits to unknown depth. 17 No. boreholes to unknown depth.
Access Roads for Northwest Shelf Development Project, Evaluative Report; Soil and Rock Engineering; September, 1980.	Report is referenced in BHP (1996) but was unavailable at the time of this review.
BHP Petroleum Methanol Plant Site – Burrup Peninsula, Preliminary Geotechnical Design Criteria; BHP Engineering; May, 1996.	Engineering geological ground model.
Syntroleum Proposed Gas to Synthetic Hydrocarbon Plant, Consultative Environmental Review; HLA Envirosciences; November, 1999.	Environmental review only.
King Bay/Hearson Cove and Mailtland Industrial Estates, Phase 1 Geotechnical Investigation Report; Soil and Rock Engineering; February, 1999.	Geotechnical Investigation Report
King Bay/Hearson Cove and Maitland Industrial Estates, Phase 2 Geotechnical Investigation Report; Soil and Rock Engineering; August, 1999.	6 No. boreholes terminating between 6m to 9.15m 10 No. testpits ranging from 0.3m to 2.5m 40 No. Dynamic Cone Penetration tests
Burrup West Service Corridor, Geotechnical Reconnaissance memo, Soil & Rock Engineering, September, 2001.	Geotechnical Reconnaissance.
Dampier Nitrogen Site, Public Environmental Review by GHD, December, 2010.	Public Environmental Review.

5.0 SITE WALKOVER RECCONAISSANCE

A site walkover was undertaken by a Principal Geotechnical Engineer from SNC-Lavalin on 6 March 2019 in order to assist with preparing the desk-top study report and enable scoping of the geotechnical investigation. The reconnaissance was carried out at Site C and Site F and the intertidal flats area inbetween. Access into the pipeline corridor for the conveyor or the port area for the storage warehouse was not possible at the time of the visit, however Lidar survey images of these sites were subsequently made available.

The Hearson Bay Cove Road transects the low lying area of Site F where colluvial materials are visible at the surface. The colluvium was observed to typically comprise a sandy silty soil with gravel and scree cobbles and boulders. Where the site rises gently up to the south small surface outcrops of granophyres geology are visible on the colluviums slopes. Figure 5-1 illustrates the nature of the colluvial material and shows the southern part of site F rising up to the southern boundary where a weathered granophyre rock outcrop is visible beyond the site boundary.

Figure 5-1 - Plate 1: View of southern aspect of Site F from bottom of slope

To the north of the Hearson Bay Cove Road the level area of Site F drops down by around 1m to 2m to the tidal flats area between sites C and F. Clayey gravel outwash materials and cemented horizons forming calcrete were visible in these slope adjacent to the tidal flats. Figure 5-2 shows the tidal flats area to the north of Site F.

Figure 5-2 - Plate 2: View of northern aspect of Site F from Hearson Bay Cove Road.

The low lying inter-tidal area was observed to comprise predominantly sandy silt that was dry at the surface but became moist when penetrated. Slightly elevated areas of surface gravel/cobbles and sandy dune type features were observed at the margins and across the flats.

The southern portion of Site C comprises the low lying intertidal area as is shown to the left of the pipeline in Figure 5-3 below.

Figure 5-3 - Plate 3: View of southern aspect of Site C near existing gas pipeline.

North of the flats, Site C rises up in elevation where colluvium similar to Site F is present and granophyres rocks outcrop at the margins of the site. The rock outcrops are jointed and weathered to form rounded block piles at the surface. The rock blocks are assessed to be of very high strength. Figure 5-4 shows the slopes of Site C rising up in elevation to the north.

Figure 5-4 - Plate 4: View of northern aspect of Site C from low laying inter-tidal area

A LiDAR image from the quarry site at the port shows the slopes to comprise batter angles of between around 45 degrees to near vertical. The geological mapping for the area indicates that the quarry consists of granophyres rocks. Well defined jointing is apparent as is scree debris at the toe of cuts, suggesting slope degradation and rockfall may be an ongoing process. The upper reaches of some batters appear to have been laid back at shallow angles in weathered material – see Figure 5-5.

Figure 5-5 - Plate 5: Lidar imagery from the quarry site at the port.

The geological map for the area indicates the pipeline easement that will form the conveyor route to comprise of predominately granophyres rocks with minor sections of the route underlain with colluvium material. Cuts excavated into the slopes to form the pipeline corridor suggest a thin soil mantle overlying fractured rocks beneath. Figure 5-6 - Plate 6: shows the pipeline corridor cut into the rock geology. In low lying areas, some portions of the corridor may have been constructed in fill although the majority of the route is likely in rock.

Figure 5-6 - Plate 6: Excavated cuts along the pipeline corridor

6.0 GROUND CONDITIONS

This section of the report summarises the currently available information that is considered relevant to the geotechnical elements of the proposed works. This information is used in the later sections as background information to aid the identification and determination of geotechnical constraints and hazards that could impact the proposed works.

6.1 Topography and Soils

The site lies either side of a tidal inlet bounded by gently sloping hills leading up to ridges where the granophyre bedrock is exposed. Figure 6-1 and Figure 6-2 show 3D-models of Site F (left) and Site C (right) with a 5x vertical exaggeration, and the Port Area site and conveyor route with a 2x vertical exaggeration, respectively. The site boundary is outlined in red, whilst the conveyor route is outlined in orange.

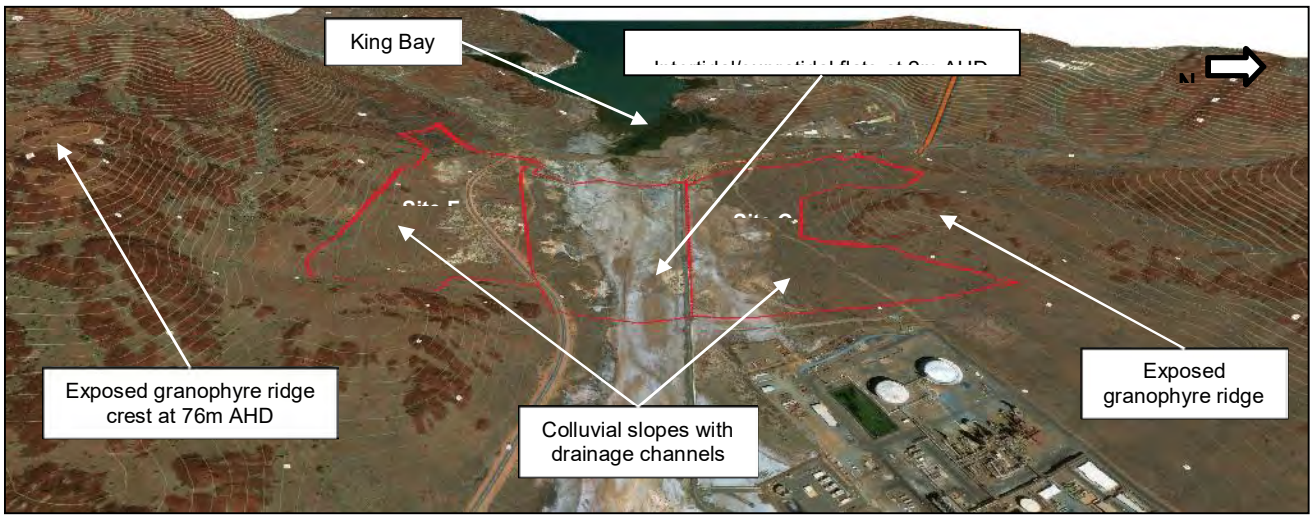


Figure 6-1 - 3D-model of site orientated west (270°) with 5x vertical exaggeration

The reddish-brown vegetation dominating the ridges in Figure 6-1 demarcates the extent of the granophyre outcrops, whilst the extent of the light grey soil cover demarcates the high-tide mark of the intertidal flats at approximately 4m AHD. The intertidal flats extend into the site from King Bay, the source of inundation. Some overland flows may also occur from the direction of Hearson Cove tothe east.

A survey of the site boundary was conducted by SNC-Lavalin in March, 2019 (Figure 6-3). Site C slopes southward from the northern ridge at 28m AHD in the north-west, and 21m AHD in the north- east, to approximately 2.4m AHD along its southern extent. Site F slopes from the south-east at 28m AHD, to approximately 6.3m AHD in the north-east, and approximately 3.2m AHD in the north-west. The intertidal flats lie at approximately 2m AHD.

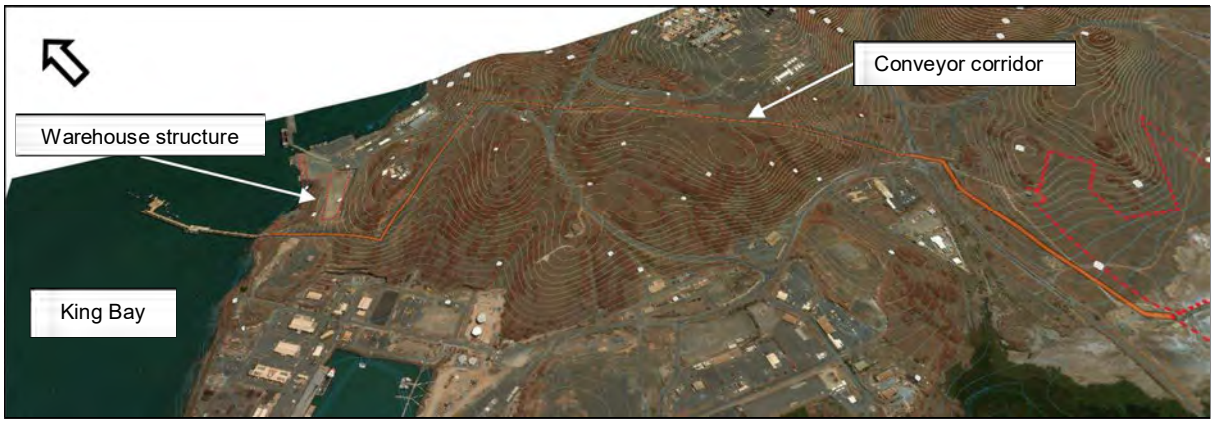


Figure 6-2 - 3D-model of the conveyor corridor and warehouse structure location, orientated north-east (45°) with 2x vertical exaggeration

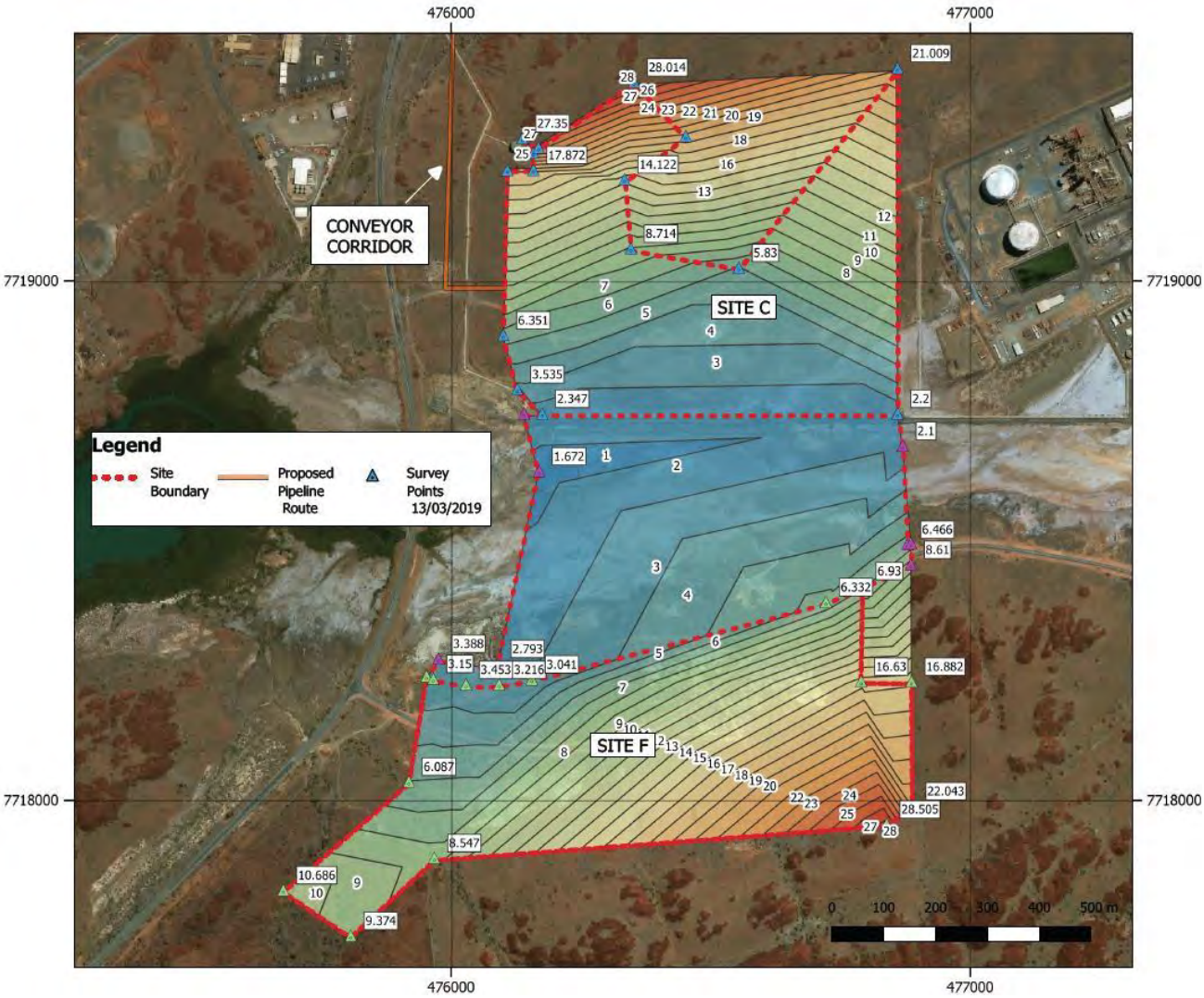


Figure 6-3 - Site elevation map generated from March 2019 survey data

6.1.1 Land Units and Soils

Figure 6-4 shows the soil landscape of the site and surrounding area:

- The Department of Primary Industries and Regional Development (DPIRD) (2018) classify the intertidal flats as a Littoral Land System, characterised as a bare coastal mudflats, supporting samphire low shrub lands and sparse acacia shrub lands at the northern and southern banks, and mangrove forests at the western extent where the intertidal flats meet King Bay.
- The slopes between the granophyre ridges and intertidal flats are classified as a Granitic Land System, characterised as rugged granitic hills, supporting shrubby hard and soft spinifex grasslands.

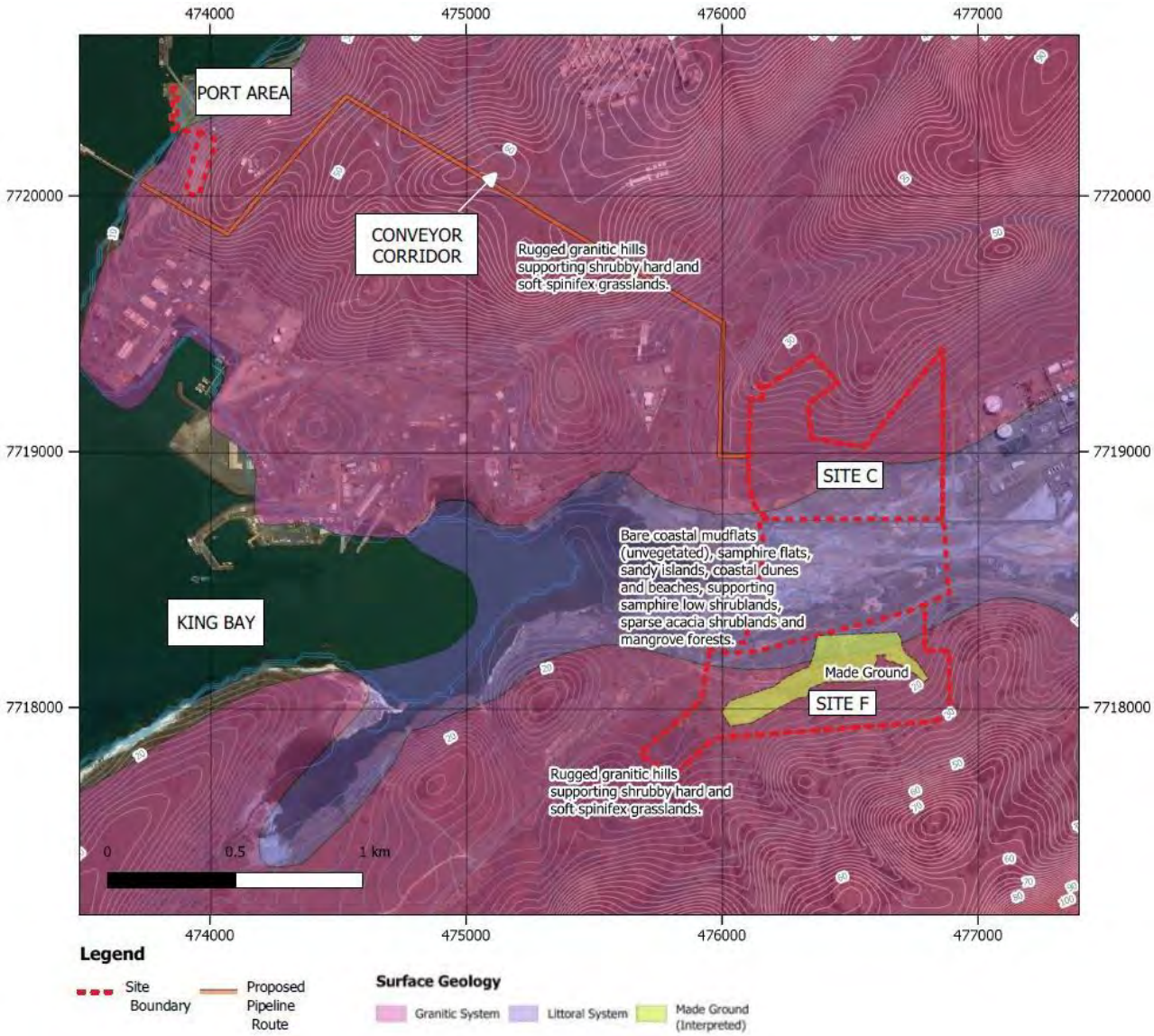


Figure 6-4 – High-level soil landscape of proposed site (after DPIRD, 2018)

6.1.2 Hydrology

Regional hydrological mapping (by Geoscience Australia, 2018) (Figure 6-5) shows a number of watercourses flowing into King Bay, east of Site C/F. These ephemeral streams only flow occasionally, typically in association with major rainfall events between December and April (GHD, 2010). Whilst there no reported permanent natural watercourses or wetlands within the site, two ephemeral watercourses appear to cross the south-west corner of Site F, and are reported to be deeply incised indicating potential to convey large flows in storm events (GHD, 2010). Stormwater runoff is reported to flow primarily from the north (URS, 2006), where shallow bedrock hinders infiltration; runoff is typically conveyed in small flows, potentially resulting in small alluvial deposits at the base of the slopes.

The two major hydrological units include the intertidal flats, classified by Geoscience Australia (2018) as a saline coastal flat, and the foreshore flat of King Bay.

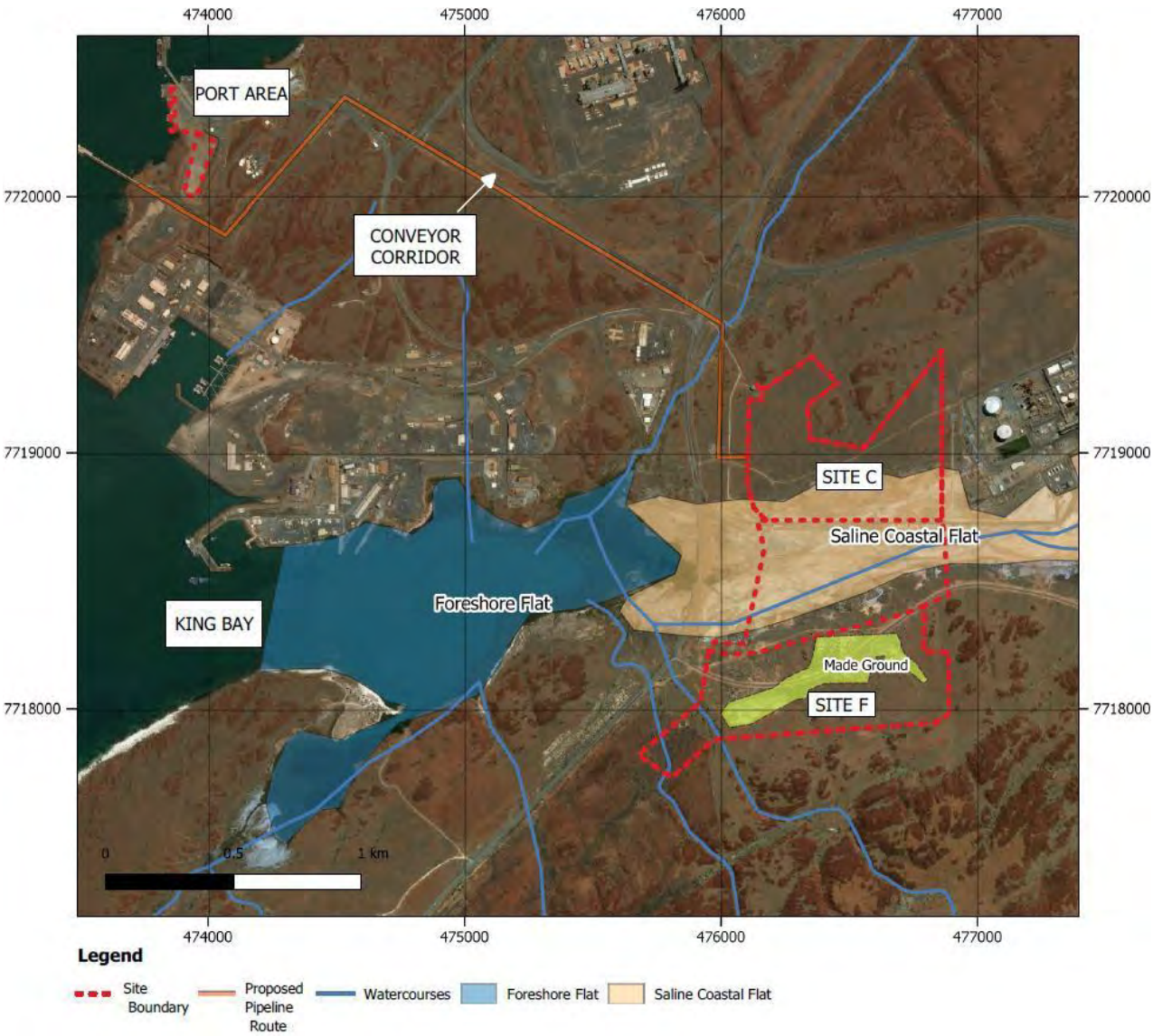


Figure 6-5 - Hydrology map (Geoscience Australia, 2018)

6.2 Geological Map

Regional surface geology from the Department of Mines (1997) is presented in Figure 6-6, whilst Table 6-1 presents descriptions for the geological units shown.

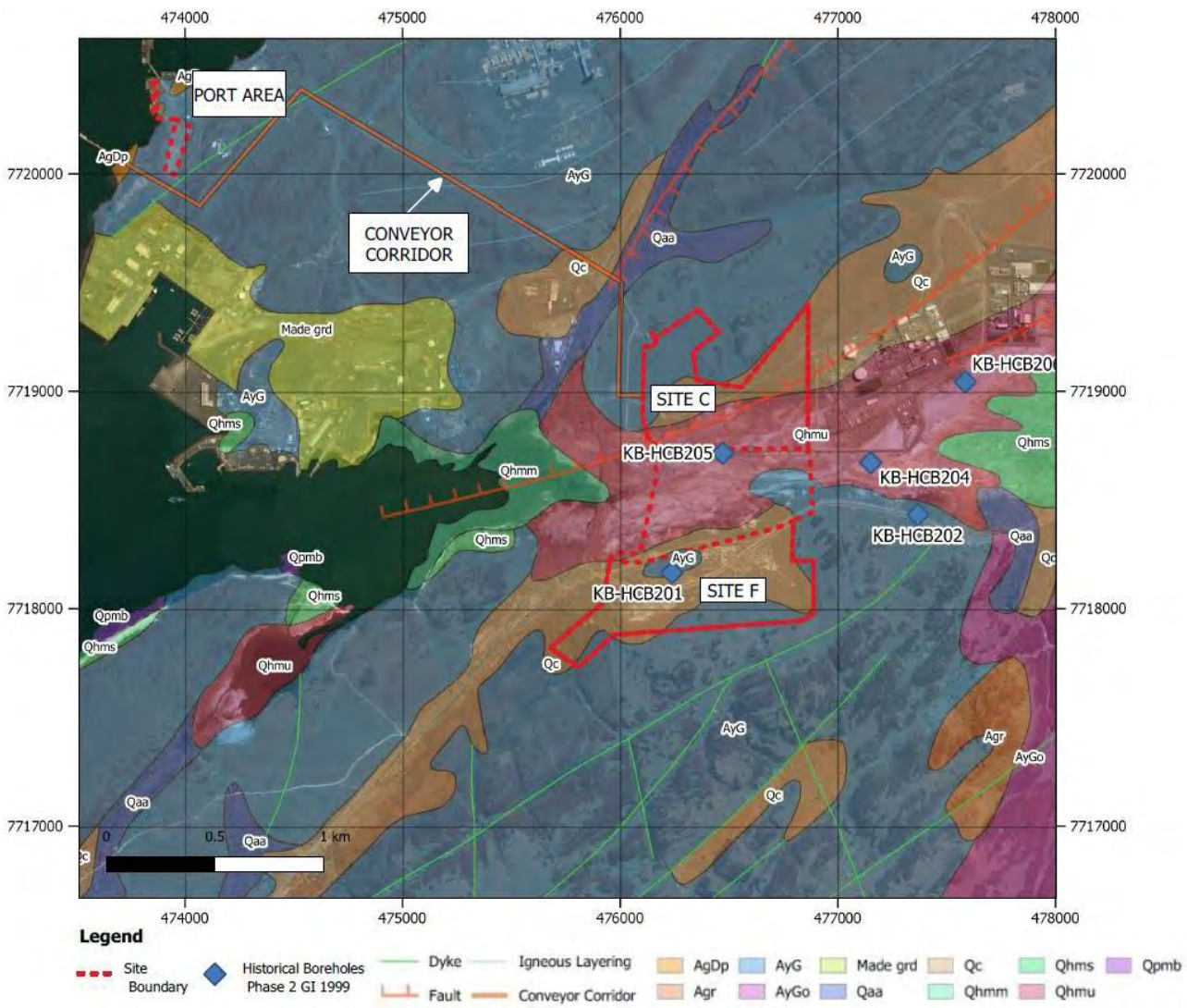


Figure 6-6 - 1:100k surface geology of proposed site (after Department of Mines, 1997).

Table 6-1 - Description of regional geological units (after the Department of Mines, 1997)

Symbol	Name	Description	Age
On Site:			
Qhmu	Saline Coastal Flat (intertidal)	Silt and mud in supratidal to intertidal flats and lagoons.	Cainozoic

Qc	Colluvium	Colluvium-sand, silt, and gravel in outwash fans and scree.	Cainozoic
AyG	Gidley Granophyre	Fine- to medium-grained granophyre, commonly porphyritic.	Archaean
Made grd	Made Ground	Made ground: highly variable, typically comprising clay, slit, sand, and gravel.	Recent
Near Site:			
Qhms	Hearsons Cove Beach Deposits	Shelly sand in coastal dunes and old beach deposits; contains Anadara granosa.	Cainozoic
Qhmm	King Cove Deposits	Marine mud and silt; intertidal with mangroves.	Cainozoic
Qaa	Alluvium	Alluvium - sand and gravel in rivers and creeks; clay, silt, and sand in channels on floodplains.	Cainozoic
Qpmb	Coastal Limestone	Coastal limestone; lime-cemented shelly sand, dune sand, and beach conglomerate.	Cainozoic
AyGo	Gidley Granophyre (Gabbro)	Gabbro.	Archaean

The geological map indicates that the site has three distinct geological areas:

- Archean **fine to medium grain granitic rock** (Gidley Granophyre), situated in the northern and southern-most higher elevation areas;
  - The Gridley Granophyre bedrock is an extremely hard mafic intrusive rock with a series of faults trending south-west/north east across the Burrup Peninsula. One large fault extends from King Bay west of the site, through Site C to Cowrie Cove to the north-east. The formation was intruded by a number of dolerite dykes, trending south-west/north-east, and exhibits igneous layering trending south-west/north-east.
- Phanerozoic (Cainozoic to Quaternary) **colluvial (and minor alluvial) sediment** comprising sand, silt, and gravel as outwash fans and scree, forming the gentle slopes between the granophyre ridges and the low-lying intertidal flats;
  - The colluvial and minor alluvial sediments were deposited by stream runoff, minor rockfall, and low energy tidal flooding.
- Phanerozoic (Cainozoic to Quaternary) **supratidal to intertidal sediments** comprising silt and mud, situated in the low-lying intertidal flats separating Site C and Site F.

Approximately 200m west of the site boundary (and 600m east of the site boundary) are Cainozoic to Quaternary deposits comprising intertidal deposits of marine muds and silts (Qhmm), and shelly sand as coastal dunes and ancient beach deposits (Qhms).

6.3 Reported Stratigraphy

The majority of studies on the project site have passed comment on the geology/soils of the area, however only two have geotechnical information available:

- BHP (1996) Methanol Plant Site – Burrup Peninsula Preliminary Geotechnical Design Criteria, located at Site F, based on data obtained from the following preliminary field and laboratory investigations:
  - Large Scale Instrument Plate Load Test at the Woodside facility north-west of the site (1986);
  - Engineering Geological Appraisal at the Methanol Plant Site (Site F) (1995);
  - Feasibility Geotechnical Investigation at the Methanol Plant Site (Site F) comprising 18 No. test pits to supplement previously excavated environmental test pits (1996); and
  - Unspecified older projects on the Burrup Peninsula.

- Soil and Rock Engineering (1999) King Bay/Hearson Cove, Desk Study (Phase 1) and Geotechnical Investigation (Phase 2) located at in Site F and the intertidal flats, commissioned by the Department of Resources Development and Landcorp for the development of theKing Bay/Hearson Cove and Maitland Industrial Estates.

Following a review of geological descriptions and geotechnical data presented in the aforementioned studies, a cross-section trending north-south through the centre of Site C and Site F is presented in Appendix 2. Based on this interpretation, the anticipated stratigraphy for Site C and Site F is presented in Table 6-2.

Table 6-2 - Anticipated stratigraphy at Site C and Site F described in accordance with AS1726:2017

Strata Name	Description of Strata	Thickness (m)
INTERTIDAL FLATS	Silty clayey SAND to silty sandy CLAY: light grey to light orange brown, fine to coarse sand, medium to high plasticity (non-plastic where loose), trace of fine gravel, with coarse shell fragments, dry to moist (MC < PL to MC ~ PL), loose to medium dense (increasing with depth) where SAND, soft where CLAY (intertidal and supratidal). Plasticity index ranges from 4-21% between KB-HCB201.	0.2 – 1.0
COLLUVIUM	Clayey sandy GRAVEL with cobbles: bluish greenish grey, fine to coarse slightly weathered to distinctly weathered granophyre gravel, sub-angular to sub-rounded, fine granophyre and shell fragment sand, wet (MC > PL), medium dense to dense (colluvial). Plasticity index reported as 15-17% in KB-HCB201.	0.5 – 2.0

BRECCIATED CALCRETED GRANOPHYRE	BRECCIATED CALCRETED GRANOPHYRE: fine to medium grained fragmented and brecciated with a calcrete cement, whitish grey, orange brown to greenish black, very low (matrix) to high (clast) strength, slightly weathered to extremely weathered, moderately to highly altered, massive, infilled clay seams are closely to widely spaced, open, clasts are fine to medium grained predominantly dark mafic minerals of coarse gravel to cobble size, matrix is sandy clay. RQD ranges from 0-70 with no apparent trend. Rockmass weathering grade estimated at III.	0.5 – 3.5
GRANOPHYRE	GRANOPHYRE: grey, fine to medium grained fragmented quartz cemented, bluish grey to orange brown low to very high strength, fresh to extremely weathered[1], locally massive with large scale igneous layering approximately 250m apart, infilled clay seams are widely spaced, moderate incidence, open, sheared zones are widely spaced but exhibit close sub- horizontal to steep incidence fractures, rarely sub-horizontal to sub-vertical wispy discontinuous calcite veinlets, very low strength in seams and factures, high strength in rock. RQA ranges from 0-100, aphantic to porphyritic, contains mafic minerals and feldspar with minor quartz. Rockmass weathering grade estimated at I to II.	N/A
NOTES: 1 – Weathering profile within the granophyre is typically moderately to extremely weathered <5m bgl, reducing to fresh to slightly weathered below 5m bgl.		

Groundwater was encountered in all boreholes in Soil and Rock Engineering's 1999 geotechnical investigation, ranging from 0.15m bgl to 0.6m bgl (approximately 2m AHD to 6m AHD). Groundwater level is considered to be at ground level in the intertidal flats, and within 0.5m of ground level in the lower slopes. There is no available information on groundwater level at the granophyre ridge crests, however the presence of dry ephemeral channels and low permeability of the bedrock indicate that groundwater level may rise rapidly in adverse weather.

No historical geotechnical investigation data was available for the warehouse structure location (disused quarry), however photographs taken on site as presented in the Site Description (Figure 5-5) show a thin residual soil underlain by weathered granophyre.

The residual soil is estimated to be <0.5m thick, and the granophyre exhibits a distinct weathering profile where <3m bgl (original ground level, pre-quarry) appears to be moderately to extremely weathered, whilst >3m bgl and current ground level of the quarry appears to be slightly weathered.

6.3.1 Made Ground

Roads/former roads traversing the site will be underlain by sub-base fill materials, in some places possibly from the borrow pit located to the west of the main Burrup Road.

Syntroleum (1999) remarks on historical operations by Woodside Petroleum in the early 1980's at the location of Site F, where there was pre weight pipe coating and concrete batching operations. Associated with these operations are large flat slabs of iron ore concrete, however in some places the slabs have been ripped by dozer tynes during rehabilitation. The stabilised ground pads are up to 150mm thick and are approximately 150m by 15m in size (BHP, 1996).

A soil dump exists beneath Hearson Cove Road (cutting through Site F) comprising imported dredged marine (saline) mangrove muds (exact extent unknown). The material is described as blue grey sandy silt with shells and nodular calcrete cobbles and boulders.

6.4 Reported Laboratory Test Results

An intrusive ground investigation was conducted by Soil and Rock Engineering (1999b) comprising of six boreholes. However, it should be noted that only two boreholes are located within the Project's site, and within the warehouse structure location. Borehole KB-HC201 is located towards the northern boundary of Site F within the colluvium and granophyre, and KB-HC205 is located at the southern extent of Site C within the intertidal flats. Table 6-3 provides a summary of the laboratory test results from the Phase 2 Geotechnical Investigation undertaken by Soils and Rock Engineering (1999b). No laboratory or *in-situ* test data was available for the Made Ground or Engineered Fill at Site F.

Table 6-3 - Summary of Laboratory Test Results (Soils and Rock Engineering 1999b).

Laboratory Test Type	Stratigraphic unit			
	Intertidal Flat	Colluvium	Brecciated Calcreted Granophyre	Granophyre
Standard Penetration Test 'N' Value	4-7	14	Refusal	36
Atterberg Limits	LL 27-35%, PI 4-19%	LL 38%, PI 15%		
Uniaxial Compressive Strength (MPa)			0.9	2.33[2] – 76.5[3;4]
Point Load Strength Is_{50} (MPa)			1.14	1.18[2] – 7.01[3]
Youngs Modulus (GPa)				19.6[2] – 94.6[3]
Poissons Ratio				0.155[2] – 0.194[3]
1D Consolidation Test[1]	Cr = 0.00014 Cc = 0.00034			
Internal Friction Angle (°)	1			
Cohesion (kPa)	4			

NOTES:

Laboratory test data was only available for limited samples from the King Bay/Hearson Cove Phase 2 Geotechnical Investigation Report (1999).
1 – Cc and Cr calculated from 1-D Consolidation Test performed on an Intertidal Flats tube sample from KB-HCB201 at 1.5m depth, available in Soil and Rock Engineering (1999).
2 – Granophyre sample exhibited moderate to extreme weathering.
3 – Granophyre sample exhibited fresh to slight weathering.
4 – UCS test sample exhibited blocky failure planes (likely along joints).

6.5 Preliminary Geotechnical Characteristics

It is recommended that the geotechnical parameters outlined in Table 6-5 be used for preliminary design purposes. Parameters have been based on site specific laboratory results, published data, know empirical relationships and engineering judgement.

All available geotechnical data is at least 20 years old, therefore stress states and groundwater regimes may have changed, and whilst conservative estimates have been presented, the data below must be considered provisional and characteristic only.

The rationale for derivation of the geotechnical parameters is summarised in Table 6-4. Where possible, a common approach has been applied, however, due to disparities in the type of data available variances may be required as set out below.

Table 6-4 - Rationale for Preliminary Geotechnical Characteristic Values

Parameter	Rationale
Bulk Unit Weight	Burt Look (2007) provides an indicative range of bulk unit weight for soil and rock, Table 7.3 and 9.2. Weathering in granitic rocks can reduce unit weight by 2kN/m^3.
Undrained Shear Strength (C_u)	An approximation of Cu = 5 * SPT'N' is common, however this correlation is known to vary from 2 – 8 (Burt Look, 2007). Stroud and Butler's (1975) graph indicates that for lower plasticity clays (PI=~15%), 8N is appropriate, in line with the approximation given in AS1726:2017.
Cohesion	Laboratory data.
Internal Friction Angle	Burt Look (2007) provides an indicative correlation between SPT N values and internal friction angle in Tables 5.3, 5.4, 5.5, and 7.9 reduced by 5° for clayey sand, and increased by 5° for gravelly sand. Where SPT data is unavailable, a range has been provided in line with the strength descriptor of the geological unit. For granitic rocks with an RQD of 0-70 as the granophyre does, internal friction angle of the **rock mass** can be reduced from 45-55° to 30°.
UCS	Laboratory testing data.
Coefficient of Volume Compressibility (m_v)	Empirical correlation using SPT N value and Burt Look (2007), Tables 11.8 and 11.9.
Undrained Elastic Modulus (Eu)	BHP Petroleum (1996) provides indicative geotechnical design criteria based on historical geotechnical site investigation (not currently available), also empirical correlation using SPT N value and Burt Look (2007), Tables 11.12, 11.13, and 11.15,
Drained Elastic Modulus (E')	BHP Petroleum (1996) provides indicative geotechnical design criteria based on historical geotechnical site investigation (not currently available), also empirical correlation using SPT N value and Burt Look (2007), Tables 11.12, 11.13, and 11.15. For soft clays at 10-30% PI, E' = Cu*270, or alternatively E'/N = 0.6-0.7.
CBR	BHP Petroleum (1996) provides indicative geotechnical design criteria based on historical geotechnical site investigation (not currently

	available). DCP data provided by Soil and Rock Engineering (1999) has also been used to correlate to *in situ* CBR using Table 5.11 of Burt Look (2007).
Bearing Capacity	BHP Petroleum (1996) provides indicative geotechnical design criteria based on historical geotechnical site investigation (not currently available).

Table 6-5 - Preliminary Geotechnical Characteristic Values

Parameter[1]	Intertidal Flats	Colluvium	Brecciated Calcreted Granophyre	Granophyre
Bulk Unit Weight (kN/m^3)	**16** (14-18)	**20** (19-21)	**20** (19-21)	**27** (25-29)
Undrained Shear Strength (C_u) (kPa)	**32** (32-56)	N/A	N/A	N/A
Effective Cohesion (kPa)	**4** (4-20)	N/A	N/A	**30** (30-50)
Effective Internal Friction Angle (°)	**15** (12-30)	**30** (30-45)	**36** (35-45)	**40** (30-55)
UCS (MPa)	N/A	N/A	**0.9** (0.5-15)	**30** (2.33[2] – 76.5[3])
Coefficient of Volume Compressibility (m_v)	**0.5** (0.5-2)	**0.08** (0.05-0.1)	N/A	N/A
Undrained Elastic Modulus (Eu) (MPa)	**8** (5-15)	**40** (20-50)[4]	**40** (20-50)[4]	**100** (100-500)[4]
Drained Elastic Modulus (E') (MPa)	**6** (5-15)	**28** (20-40[4]	**28** (20-40)[4]	**70** (70-350)[4]
Poisson's Ratio	**0.5**	**0.4**[5]	N/A	N/A
CBR (%)	**5** (2-15)	**40** (20-50)	**40** (40-60)	**100**
Bearing Capacity (kPa)	N/A[6]	**150**[4]	**150**[4]	**1000**[4] (500[2]-2000[3])

Notes:
1 – Preliminary geotechnical parameters are given in bold, with a typical range for the strata in brackets where there is significant variability or lack of reliability.
2 – Granophyre exhibiting moderate weathering.
3 – Granophyre exhibiting slight weathering to fresh.
4 – In accordance with BHP (1996).
5 – Colluvium is predominantly gravel with rare thin clay lenses.
6 – Not suitable as bearing strata.

6.6 Geo-Environmental Considerations

6.6.1 Acid Sulphate Soils

Acid sulphate soil (ASS) are naturally occurring soils containing iron sulphides. These soils are usually not harmful when left undisturbed in the anaerobic environment. However, when they are exposed to the air and water through disturbance, the soil undergoes oxidisation forming sulphuric acid which has the ability to break heavy metal bonds and release heavy metals such as aluminium, iron and arsenic into the water.

The presence of ASS is reported to be located within the southern section of Site C (GHD, 2010). The ASS is categorised as Class 1 nature with a High to Moderate disturbance risk (< 3m from the surface). Whereas, there is minor potential for ASS to exist and/or develop in Site F (HLA Envirosciences, 1999) due to the historical disturbance (excavation) of native soil and rock, as mentioned in Section 4.1 of this report.

Acid Sulphate Soil mapping information based on published data is presented in Figure 6-7. The previous geotechnical investigation reports are in line with the published data source.

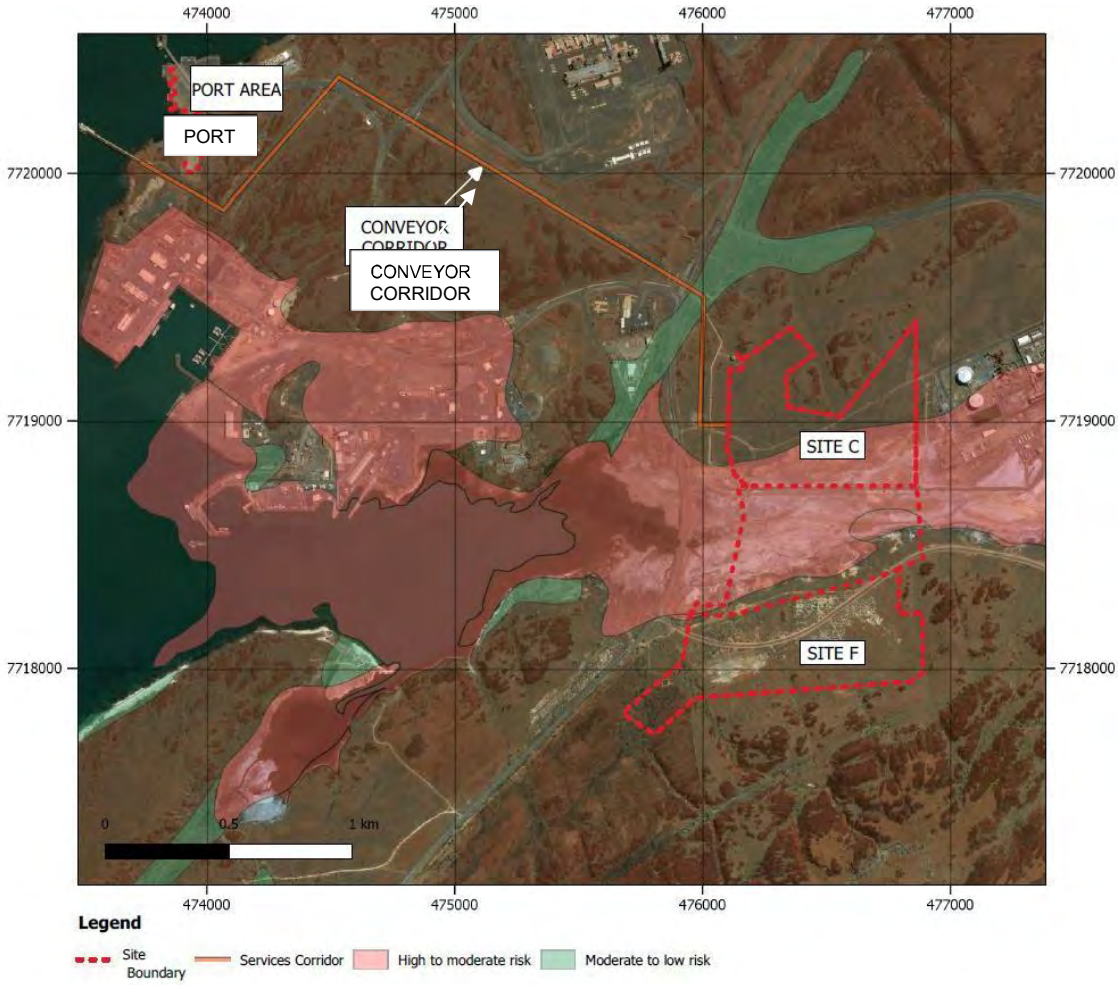


Figure 6-7 - Published Acid Sulphate Soil Data (Government of Western Australia, 2018).

The associated construction and environmental risk and consequences of disturbing the ASS especially during the construction earthworks is detailed in Section 7.10 of this report.

6.6.2 Groundwater Quality

According to sample test results taken from the two groundwater monitoring bores installed within the mudflat region located in Site F, the water quality is uncontaminated with no hydrocarbon or organic compound detected and all metal concentrations, sulphates and pH are within regulatory guidelines (HLA Envirosciences, 1999). However, the water quality were shown to be significantly saline which is typical given the intertidal nature of the mudflat region.

7.0 PRELIMINARY GEOTECHNICAL CONSIDERATIONS

This section of the desk-top study report seeks to set out the main geotechnical aspects that will require consideration during preliminary design. The discussion provided below and the derivation of geotechnical parameters is based upon limited available information that has been provided from nearby sites. No intrusive investigation, insitu testing or laboratory testing for the proposed Perdaman sites has been carried out and therefore design recommendations should be treated as preliminary and subject to revision when the results of the geotechnical investigation and geological mapping exercises become available.

A risk register is presented in Appendix 3.

7.1 Excavation Conditions

Preliminary design indicates that excavations up to 11 m deep are required at Site F and up to 6m deep at Site C. This will require excavation through surface colluvial deposits and a weathered rock profile that will likely become increasingly difficult to excavate with depth.

Conventional plant such as bulldozers, hydraulic excavators and backhoes should be adequate for the excavation of the soils comprising the intertidal flats and colluvial hillslopes. Similar plant may be suitable for excavating the blocky granophyre rock on the surface only. Excavations deeper than the fractured and weathered surface rocks will likely require ripping using the tyne of a dozer. Excavation difficulty will increase with depth as rock material strength and fracture spacing increases and extremely hard ripping conditions should be allowed for. The use of an impact hammer fitted to an excavator is likely to significantly improve productivity. Ripping may even prove impractical in the deepest excavations and blasting may be required. Should blasting not be permitted then chemical expansive grout may be an option.

7.2 Suitability of Materials for Re-use

The soils comprising the intertidal flats will very likely be unsuitable for re-use as fill given the highly saline and potential acid sulphate soils environment. Slope colluvial materials comprising silt/sand with gravel, cobbles and boulders should be suitable provided any topsoil and organic material is discarded. Excavated rock will be suitable for use as rock fill at the site. Crushing will likely be required following excavation to achieve a rock fill specification. Extremely high strength rock should be expected when considering crushing plant.

7.3 Slope Batter Angles

The soils comprising the inter-tidal flats will be subject to a high groundwater table and tidal inundation and as such the saturated sandy silty soils will not remain stable at anything but very shallow batters. Where excavation is required in these materials which could be over 2m in thickness, excavation support should be considered along with groundwater control measures.

The colluvial materials on the lower slopes are not expected to be much thicker than around 1m. Temporary batters of 1V:2H and permanent batters of 1V:3H should be suitable above the groundwater table. Cobbles and boulders that could roll down slopes should be removed from slope faces and crests.

Rock cut slopes may be battered back to 1V:1.5H through upper weathered materials, say to 2m deep, and a steeper 1V:0.2H in more competent rock beneath. An allowance should be made for rock netting and spot bolting in rock cuts. Drainage should be conveyed away from the toe and crest of slopes in drainage channels.

7.4 Slope Stability

No evidence of slope instability processes were observed at the site during the walkover other than erosion and minor slumping of the colluvium/ calcrete terrace slope bordering the tidal flats on the south side of the inlet.

Cut rock platforms may be assumed to be stable for preliminary design purposes however slope stability analyses should be undertaken where heavily loaded structures are founded close to the edge of platforms. Similarly, factor of safety analyses will be required where loading close to the edge of constructed fill slopes will occur.

7.5 Erosion Protection

Erosion protection measures should be allowed for on any cut soil slopes and constructed fill slopes. It is likely that the climatic environment is unsuitable for sustaining vegetation on slopes. Fill slopes constructed for raised platforms at Site C and the causeway embankment within the intertidal area will require rip-rap protection with a geotextile beneath. The rock excavated from within the site should be suitable for rip-rap subject to block shape and durability requirements being satisfied. The fill within any slopes subject to inundation should be designed to a specification such that collapse settlement is mitigated against and the wash-out of fines does not occur.

7.6 Foundation Conditions

The superficial deposits comprising the intertidal flats will be highly variable in composition and low in strength. These soils should not be considered as a suitable founding material and it is recommended that they are removed down to weathered rock beneath the footprint of the causeway embankment and fill platform at Site C. Dewatering or groundwater exclusion will likely be requiredfor these areas to enable cleaning of the base, inspection and backfilling.

Any structures that are to be located outside of the platforms that are to be excavated into rock may be founded on the colluvial material where allowable bearing capacities of 150-200 kPa should be available assuming the site is not sloping. Where overturning forces are to be resisted, anchoring or piling into the underlying rock will be necessary.

For footings on weathered rock a presumed allowable bearing capacity of 500 kPa is recommended. For less weathered material at least 1000 kPa should be available. For structures that are required to resist uplift or lateral forces, rock anchors or piles will be necessary.

7.7 Conveyor Route

It is anticipated that the conveyor route will be underlain by rock within the pipeline easement where shallow cutting into the landscape appears to have occurred over much of the pipeline corridor. Adequate bearing capacity should be available for conveyor footings and where tie-down anchors or piles are required to resist uplift and lateral forces subject to confirmation by site investigation. Should the pipeline corridor be constructed in fill over any sections within low lying terrain then conveyor footings should be taken beneath the fill to found within the rock strata beneath.

For the conveyor route adjacent to Site C (i.e. not within the existing pipeline easement) footings should be taken through the colluvium to found in the rock strata beneath. A site walkover of the route should be undertaken to confirm these assumptions and borehole investigations should be undertaken at the location of critical structures.

7.8 Warehouse Structure within the Port Area

Lidar imagery shows batter angles vary from around 45 degrees to near vertical in the old quarry. These slopes appear stable however some loose blocks are visible and scree at the base of slopes indicates ongoing minor degradation. For preliminary design purposes, slopes that are not required to be excavated to facilitate the warehouse footprint can remain at existing slope angles assuming space is available at the toe for a rock trap ditch or fence to collect falling debris. Where space is not available the scaling of loose material from slope faces and slope netting should be allowed for.

Where excavation of the existing quarry wall is necessary a cut slope face of 1V:0.2H may be allowed for with say the upper two metres of weathered material being laid back to 1V:2H. For high slopes, mid-slope benches 3m wide should be constructed at every 6m in height. Slope face netting and spot bolting should be allowed for unless adequate space is available to collect falling debris at the toe of the slope. Drainage should be constructed at the toe and crest to convey flows away from the slopes. Geological mapping of the rock slopes should be undertaken to enable adequate detailed design.

7.9 Seismicity

Based on AS1170.4–2007, Structural design Actions Part 4; Earthquake Actions in Australia, the Hazard Factor (Z) for the Burrup Peninsular 0.12. Assuming soils are removed and all structures are founded on rock then Sub-soil Class Be – Rock should apply.

7.10 Acid Sulphate Soils

Given the proposed construction earthworks for the site which includes a Cut and Fill methodology for the northern section for Site C (as per memo: William Woolnough, SNC-Lavalin, 2019). It is recommended that field screening during investigation and laboratory testing for the presence ASS, should be conducted in low lying areas of the site.

8.0 CONCLUSION AND RECOMMENDATIONS

This desk-top study report has been prepared using information available at the time of writing and should be considered preliminary only. Following completion of the geotechnical site investigation and geological mapping, an interpretive geotechnical report should be prepared. The interpretive report will supersede the desk-top study and the project design should then be revised in light of the site specific geotechnical information.

One of the main geotechnical risks is the excavation of the rocks at the site as this can only be determined from strength and joint spacing information recovered from rotary cored boreholes. There has been much industrial development in the area including the adjacent ammonia plant, construction of the pipeline easement and the quarry at the port. Enquiries should be made to these organisations and if geotechnical information is available for these sites then this desk top study should be updated with the relevant details.

A significant part of the site is to be constructed on a platform raised above the inter-tidal flats. The design of the platform and the specification of the bulk fill will need to take cognizance of the loading intensity, including dynamic loads of structures and also consider the potential for fluctuating groundwater levels associated with the inter-tidal flats.

Significant quantities of unsuitable materials, both saline and potentially acidic, may be required to be removed from beneath fill platforms and causeways if excavation of the alluvial soils is to occur prior to construction of the fill platform over much of site C and the causeway. Costs for disposal off-site may therefore be high. Characterisation of the alluvial soils will be required as part of the geotechnical site investigation in terms of both chemical composition and grading e.g. clay, silt, sand and gravel. This will enable other options to be assessed as an alternative to excavation, disposal off-site and replacement. Other options to be considered could comprise; consolidating compressible soils insitu with surcharge, treating the soils insitu to improve bearing capacity (ground improvement with cement and admixtures) or excavation and on-site treatment within treatment pads to mix and neutralise soils and improve engineering fill characteristics such that the materials may be re-used as fill. The most cost effective solution can only be determined once the results of the site investigation are received.

9.0 REVISION HISTORY

REVISION	COMMENTS/NOTES
A1	Draft for internal review
B1	Issued for Internal Review

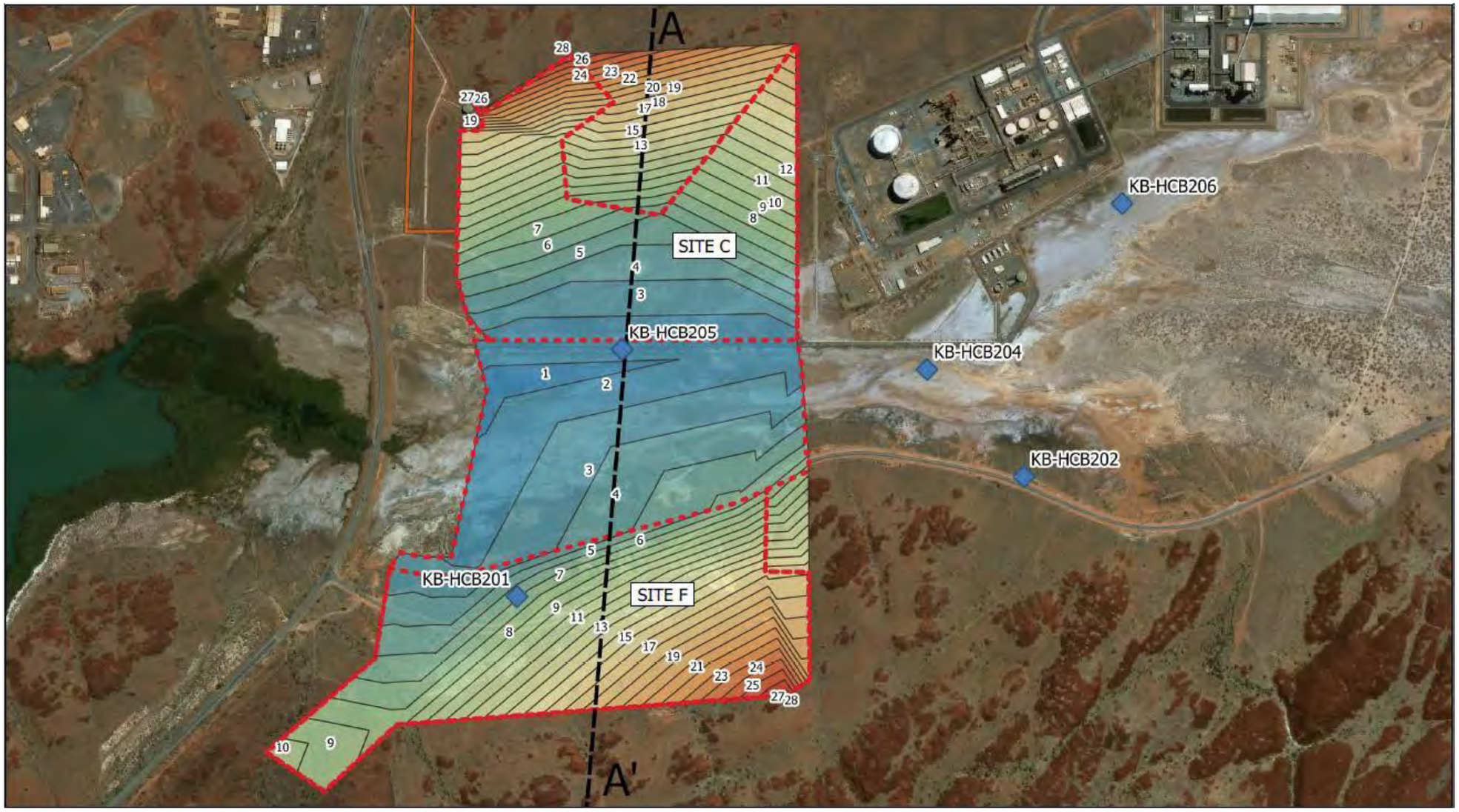
APPENDIX 1 – PROJECT DELIVERY APPLICABILITY

- ☐ Proposals
- ☒ Studies
- ☐ Preliminary Engineering
- ☐ FEED
- ☐ Detailed Design
- ☐ EPC
- ☐ Project Management
- ☐ Technical Services
- ☐ Procurement
- ☐ Construction Management
- ☐ Construction
- ☐ Commissioning
- ☐ Site Services
- ☐ Ops and Maintenance

APPENDIX 2 – PRELIMINARY GEOLOGICAL SECTION

PERDAMAN DESTINY PROJECT: Site C and F Preliminary Geological Section

SHEET 1/2



LEGEND:

Anticipated groundwater level

INTERTIDAL FLATS: silty clayey SAND grading to silty sandy CLAY with depth.

COLLUVIUM: clayey sandy GRAVEL with cobbles and boulders.

BRECCIATED CALCRETED GRANOPHYRE: fine to medium grain fragmented and brecciated calcreted granophyre, extremely weathered to highly weathered.

GRANOPHYRE: fine to medium grain fragmented and quartz cemented granophyre (light red indicates moderate weathering, darker red indicates slight weathering to fresh).

NOTES:

1. The geological profile presented is schematic only based upon limited desk study information and should not be used for detailed design.
2. Some features may appear exaggerated due to different V:H scales.
3. Ground level based on SNC-L survey data collected in March 2019.
4. Drawing to be read in conjunction with the attached Geotechnical Desk Study Ref. 140436-000-41EW-0001.

DRAWN BY: M. LEE
REVIEWED BY: S. MOORE
PRODUCED: 08/04/2019

IN ASSOCIATION WITH:
140436-0000-41EW-0001

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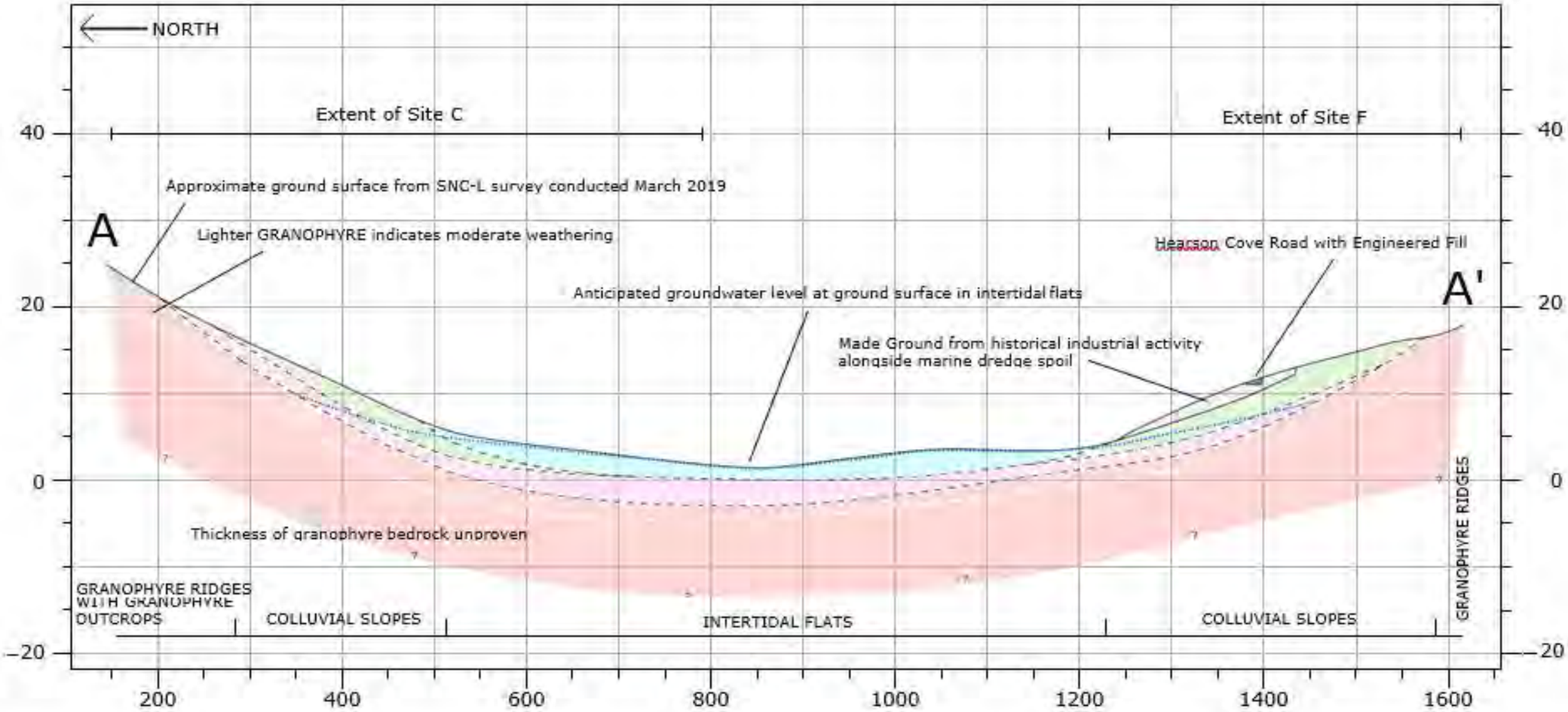
PERDAMAN DESTINY PROJECT: Site C and F Preliminary Geological Section

SHEET 2/2



LEGEND:

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COLLUVIUM: clayey sandy GRAVEL with cobbles and boulders.

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DRAWN BY: M. LEE
REVIEWED BY: S. MOORE
PRODUCED: 08/04/2019

IN ASSOCIATION WITH:
140436-0000-41EW-0001

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APPENDIX 3 – RISK REGISTER

Key to probability and severity ratings.

Probability and severity ratings

Probability		Severity	
5	Almost certain. May occur many times.	5	Multiple fatality / Major environmental incident threatening public health and criminal liability. Unsustainable costs and programme delay.
4	Probable, not surprising. May occur more than once.	4	Fatality / Environmental incident causing criminal liability. Significant increase in construction costs and delay to programme.
3	Possible. Likely to occur sometime.	3	Major injury > 3 days / Environmental incident triggering damage or complaint. Increased construction costs and programme delay.
2	Remote, though conceivable.	2	Major injury < 3 days / Environmental incident requiring management response. Small impact to costs and minor programme delay.
1	Improbable.	1	Negligible.

Risk Matrix

Severity					
5	M	H	S	S	S
4	M	H	S	S	S
3	L	M	H	S	S
2	L	M	H	H	H
1	L	L	M	H	H
	1	2	3	4	5
	Probability				

Action Required

Risk Level		Action by Designer
S	Severe	Amend design to reduce risk, or seek alternative option. Only accept option if justifiable on other grounds.
H	High	
M	Medium	Check that risks cannot be further reduced by simple design changes.
L	Low	

General geotechnical and geoenvironmental risks.

(1)	(2)	(3)	(4)	(5)			(6)	(7)			(8)	(9)
Hazard Reference	Activity/Process/ Material/Element	Hazard (also indicate who is at risk and how)	Stage of Work	Initial Risk Level			Risk Control Measures: Design action taken, record of decision process including option considered, design constraints and justification for options/actions not having been taken	Residual Risk Level			Is there a 'significant' residual risk to be passed on? (Y/N)	Status (Active / Closed)
				Probability	Severity	Risk Level		Probability	Severity	Risk Level		
Generic risks												
1	Access to site	Collision with live traffic at entry/egress, risk of injury or death to site personnel and the public	Ground investigation and construction	3	4	S	1. Personnel to receive appropriate training. 2. Vehicles/plant to be suitably marked/signalled. 3. Only approved vehicles to be used to access sites in official access/egress points. 4. Personnel to wear suitable Personal Protective Equipment (PPE) at all times, including high visibility clothing (trousers and long sleeve jacket).	2	4	H	Y	Active
2	Access to/ working on or adjacent to slopes or uneven ground	Toppling of plant while driving/operating on uneven slope, risk of injury to site personnel	Ground investigation and construction.	2	3	H	1. Contractor to consult with personnel who has been on site to obtain the appropriate measures prior to commencement of ground investigation works. 2. Contractor to raise awareness of uneven/unstable slopes. 3. Personnel to wear suitable PPE at all times, including lace up steel mid sole and toe capped boots. 4. Contractor to establish safe working area and set up exclusion zone around work site. 5. Setting up on / traversing slopes to be avoided where possible. 6. Entry/egress points situated to minimise slope traversing. 7. Contractor to be suitably qualified to operate machinery. 8. All staff to attend induction and tool box talks as appropriate.	2	2	L	Y	Active

General geotechnical and geoenvironmental risks.

(1)	(2)	(3)	(4)	(5)			(6)	(7)			(8)	(9)
Hazard Reference	Activity/Process/ Material/Element	Hazard (also indicate who is at risk and how)	Stage of Work	Initial Risk Level			Risk Control Measures: Design action taken, record of decision process including option considered, design constraints and justification for options/actions not having been taken	Residual Risk Level			Is there a 'significant' residual risk to be passed on? (Y/N)	Status (Active / Closed)
				Probability	Severity	Risk Level		Probability	Severity	Risk Level		
3	Access to/working in floodplain	Vehicles and towed plant losing traction in flooded/muddy floodplain, potential for minor differential settlement causing imbalance	Ground investigation and construction	2	2	M	1. Contractor to consult with personnel who has been on site to obtain the appropriate measures prior to commencement of ground investigation works. 2. Contractor to raise awareness of flooded ground. 3. Understanding of topography and geology prior to mobilization.	2	2	M	N	Active
4	Driving	Collision whilst driving to/from and around site. Risk of injury or death to site personnel and the public.	Ground investigation and construction	3	4	S	1. Only suitably qualified personnel with appropriately marked up vehicles may enter site during works period. 2. Staff to take suitable breaks whilst driving and stop if tired. 3. Staff to hold a full Australian driving licence and undergo any internal driver safety awareness courses.	2	4	H	Y	Active
5	Personnel working in close proximity to plant	Collision with moving plant. Risk of injury or death to site personnel.	Ground investigation and construction	4	4	S	1. Contractor to provide training to personnel before commencing work on site. 2. Personnel to wear PPE at all times, including high visibility clothing and hard hat. 3. All personnel operating machinery to be competent and hold appropriate competency cards. 4. A safe working distance is to be maintained by all staff from moving machinery and equipment. 5. Acknowledgment from machine operator should be received and machine stopped before staff enter safety zone of plant or machinery.	3	3	H	Y	Active

General geotechnical and geoenvironmental risks.

(1)	(2)	(3)	(4)	(5)			(6)	(7)			(8)	(9)
Hazard Reference	Activity/Process/ Material/Element	Hazard (also indicate who is at risk and how)	Stage of Work	Initial Risk Level			Risk Control Measures: Design action taken, record of decision process including option considered, design constraints and justification for options/actions not having been taken	Residual Risk Level			Is there a 'significant' residual risk to be passed on? (Y/N)	Status (Active / Closed)
				Probability	Severity	Risk Level		Probability	Severity	Risk Level		
6	Public access	Confrontation with aggressive members of the public. Risk of intimidation and injury to site personnel.	Ground investigation and construction	3	2	H	1. All personnel to be calm and polite if confronted by any member of the public. 2. In the event of aggressiveness or safety concerns for site personnel, Police are to be called immediately. 3. No valuables are to be left visible in vehicles at any time.	2	2	M	Y	Active
Ground risks												
7	Buried and overhead services.	Striking buried and overhead services. Gas pipes, electricity cables, water main, communications cables and fuel infrastructure on site. Health and Safety of contractor's personnel.	Ground investigation and construction.	3	4	S	1. Ground Investigation Specification to provide a utilities map for overhead and buried services. 2. A Dial-Before-You-Dig (DBYD) should be conducted for the site area prior to any excavation. 3. Contractor to positively locate services before commencing excavation via a service utility locator contractor.	2	4	H	Y	Active
8	Ground conditions differ to that expected (e.g. historical landfill sites, infilled sand and gravel pits and embankment fill material for berm).	Redesign, programme delays, cost implications.	Ground investigation, construction and maintenance.	3	2	H	1. Understanding of the ground conditions via the desktop study to assess the ground conditions. 2. Geotechnical supervision required for the duration of geotechnical site activities. 3. Should the design change significantly or should uncertainties in the ground conditions arise following assessment, it is advised that supplementary ground investigation be performed and a ground model of the site be produced. 4. Results from the site specific ground investigation to be used in the GDR and to determine if a second phase of ground investigation is required.	2	2	M	Y	Active

General geotechnical and geoenvironmental risks.

(1)	(2)	(3)	(4)	(5)			(6)	(7)			(8)	(9)
Hazard Reference	Activity/Process/ Material/Element	Hazard (also indicate who is at risk and how)	Stage of Work	Initial Risk Level			Risk Control Measures: Design action taken, record of decision process including option considered, design constraints and justification for options/actions not having been taken	Residual Risk Level			Is there a 'significant' residual risk to be passed on? (Y/N)	Status (Active / Closed)
				Probability	Severity	Risk Level		Probability	Severity	Risk Level		
9	High groundwater table, water ingress, and perched groundwater	Redesign, programme delays, cost implications.	Ground investigation, construction and maintenance.	4	2	H	1. Understanding of the ground conditions via the desktop study to assess the ground conditions. 2. Geotechnical supervision required for the duration of geotechnical site activities. 3. Should the design change significantly or should uncertainties in the ground conditions arise following assessment, it is advised that supplementary ground investigation be performed. 4. Results from the site specific ground investigation to be used in the GDR.	3	2	M	Y	Active
10	Presence of ground conditions with shrink-swell potential	Redesign, programme delays, cost implications, long term maintenance costs, disruption.	Ground investigation, construction and maintenance.	4	2	H	1. Understanding of the ground conditions via the desktop study to assess the ground conditions. 2. Geotechnical supervision required for the duration of geotechnical site activities. 3. Ground improvement to be designed and implemented if deemed necessary.	3	2	M	Y	Active
11	Encountering extremely soft/low strength ground conditions (e.g. Made Ground, Head Deposits, Alluvium, infilled sand and gravel pits, berm embankment material) and weathered bedrock	Redesign, programme delays, cost implications.	Ground investigation, construction and maintenance.	5	2	H	1. Understanding of the ground conditions via the desktop study to assess the ground conditions. 2. Geotechnical supervision required for the duration of geotechnical site activities. 3. Perform targeted geotechnical sampling and laboratory testing to facilitate design. 4. Produce a site specific ground model. 5. Use ground improvement techniques where appropriate.	4	2	H	Y	Active
12	Encountering hard layers in the Made Ground, gravel strata, bedrock and tree roots.	Redesign, programme delays, cost implications.	Ground investigation and construction.	4	2	H	1. Understanding of the ground conditions via the desktop study to assess the ground conditions. 2. Geotechnical supervision required for the duration of geotechnical site activities.	3	2	M	Y	Active

General geotechnical and geoenvironmental risks.

(1)	(2)	(3)	(4)	(5)			(6)	(7)			(8)	(9)
Hazard Reference	Activity/Process/ Material/Element	Hazard (also indicate who is at risk and how)	Stage of Work	Initial Risk Level			Risk Control Measures: Design action taken, record of decision process including option considered, design constraints and justification for options/actions not having been taken	Residual Risk Level			Is there a 'significant' residual risk to be passed on? (Y/N)	Status (Active / Closed)
				Probability	Severity	Risk Level		Probability	Severity	Risk Level		
							3. Perform targeted geotechnical sampling and laboratory testing to facilitate design. 4. Produce a site specific ground model. 5. Use appropriate equipment during ground investigation and construction to allow for efficient and effective excavation.					
13	Any presence of contaminated ground and groundwater, and ground gas (including from historical landfill sites, infilled sand and gravel pits, berm material, and stockpiled material)	Sickness, injury or fatality to personnel if ingested / inhaled / dermally absorbed or other human and/or controlled waters receptors. Waste disposal and/or treatment costs. Programme delays and potential redesign.	Ground investigation and construction.	4	3	S	1. Perform a site specific ground investigation with targeted contamination sampling and laboratory testing to determine the presence and extent of any contamination 2. Geotechnical supervision required for the duration of geotechnical site activities. 3. Based on the findings of the ground investigation, contamination risk assessments should be carried as necessary out to determine if there is a risk from the contamination and appropriate remedial actions / measures where required. 4. Contractor to provide training to personnel. 5. Personnel to wear PPE, including appropriate gloves and safety glasses. 6. Should contamination be encountered, works should cease until further instruction is sought from either the Designer's site representative or Client's representative. 7. Supplementary ground investigation and testing to better delineate areas of significant contamination assess the risk.	2	2	M	Y	Active
14	Destabilisation or settlement of existing	Injury or fatality to Site personnel, programme delays, damage of	Ground investigation and construction.	3	2	H	1. Perform a site specific ground investigation. 2. A bearing capacity and slope stability, and seepage assessment should be produced.	2	2	M	Y	Active

General geotechnical and geoenvironmental risks.

(1)	(2)	(3)	(4)	(5)			(6)	(7)			(8)	(9)
Hazard Reference	Activity/Process/ Material/Element	Hazard (also indicate who is at risk and how)	Stage of Work	Initial Risk Level			Risk Control Measures: Design action taken, record of decision process including option considered, design constraints and justification for options/actions not having been taken	Residual Risk Level			Is there a 'significant' residual risk to be passed on? (Y/N)	Status (Active / Closed)
				Probability	Severity	Risk Level		Probability	Severity	Risk Level		
	slopes due to excavation or berm improvements.	reputation, cost implications.					3. A competent Contractor should be employed to carry out Site works. 4. Geotechnical supervision required for the duration of geotechnical site activities.					
15	Unidentified existing infrastructure and services (including wells, disused utilities etc.).	Redesign, programme delays, cost implications.	Ground investigation and construction.	3	2	H	1. Contractor to carry out risk assessment to include voltage and height of overhead services, works being carried out close to overhead services, size and reach of machinery, safe clearance distance, site conditions and competency of staff. 2. Ground Investigation Specification to provide a utilities map for overhead and buried services. 3. Contractor to locate services via utility service locator contractor before commencing excavation via a utility clearance contractor.	2	2	M	Y	Active
16	Re-use of material	Redesign, programme delays, cost implications.	Ground investigation and construction.	4	3	S	1. Perform a site specific ground investigation with targeted contamination sampling and laboratory testing to determine the presence and extent of any contamination 2. Geotechnical supervision required for the duration of geotechnical site activities. 3. Based on the findings of the ground investigation, contamination risk assessments should be carried as necessary out to determine if there is a risk from the contamination and appropriate remedial actions / measures where required.	2	3	H	Y	Active

General geotechnical and geoenvironmental risks.

(1)	(2)	(3)	(4)	(5)			(6)	(7)			(8)	(9)
Hazard Reference	Activity/Process/ Material/Element	Hazard (also indicate who is at risk and how)	Stage of Work	Initial Risk Level			Risk Control Measures: Design action taken, record of decision process including option considered, design constraints and justification for options/actions not having been taken	Residual Risk Level			Is there a 'significant' residual risk to be passed on? (Y/N)	Status (Active / Closed)
				Probability	Severity	Risk Level		Probability	Severity	Risk Level		
17	Cutting of slopes and temporary stockpiling of material	Toppling of boulders and slope instability. Health and safety risk.	Ground investigation and construction.	3	3	H	1. Geotechnical supervision required for the duration of geotechnical site activities. 2. Temporary stockpiling of material is to follow the recommended gradient slopes and inspected by a geotechnical engineer. 3. If necessary, rock netting and spot bolting into rock cuts to mitigate toppling of boulders.	3	3	H	Y	Active
18	Erosion of material	Erosion of constructed fill slope, collapsed settlement, wash-out fan.	Ground investigation and construction.	3	4	S	1. Rip-rap protection and geotextile fabric to be installed during the compaction of engineered slopes 2. Fill material should be blocky in shape and durability requirement being satisfied . 3. Geotechnical supervision required for the duration of geotechnical site activities.	3	3	H	Y	Active
19	Adequate load resistance	Collapsed settlement, up-lift and lateral movement.	Ground investigation and construction.	3	3	H	1. Geotechnical supervision required for the duration of geotechnical site and construction activities. 2. Adequate and suitable design parameters. 3. Utilisation of tie-down anchors to resist uplift.	3	2	H	Y	Active
20	Acid Sulphate Soils	Creation of sulphate acid when disturbed, causing damages to waterway, aquatic life and vegetation	Ground investigation and construction.	3	4	S	1. Geotechnical supervision required for the duration of geotechnical site and construction activities. 2. Produce risk maps to predict the location and depth of acid sulphate soils. 3. Conduct simple field testing when excavating as a form of monitoring when encounter acid sulphate soils	3	3	H	Y	Active

Attachment D. Clough Perdaman Urea Geotechnical Investigation – Interpretative Report (COFFEY, 2020)

Attachment E. Clough Perdaman Urea Geotechnical Investigation – Factual & Interpretative Report (COFFEY, October 2020 - 754-PERGE271567-R05

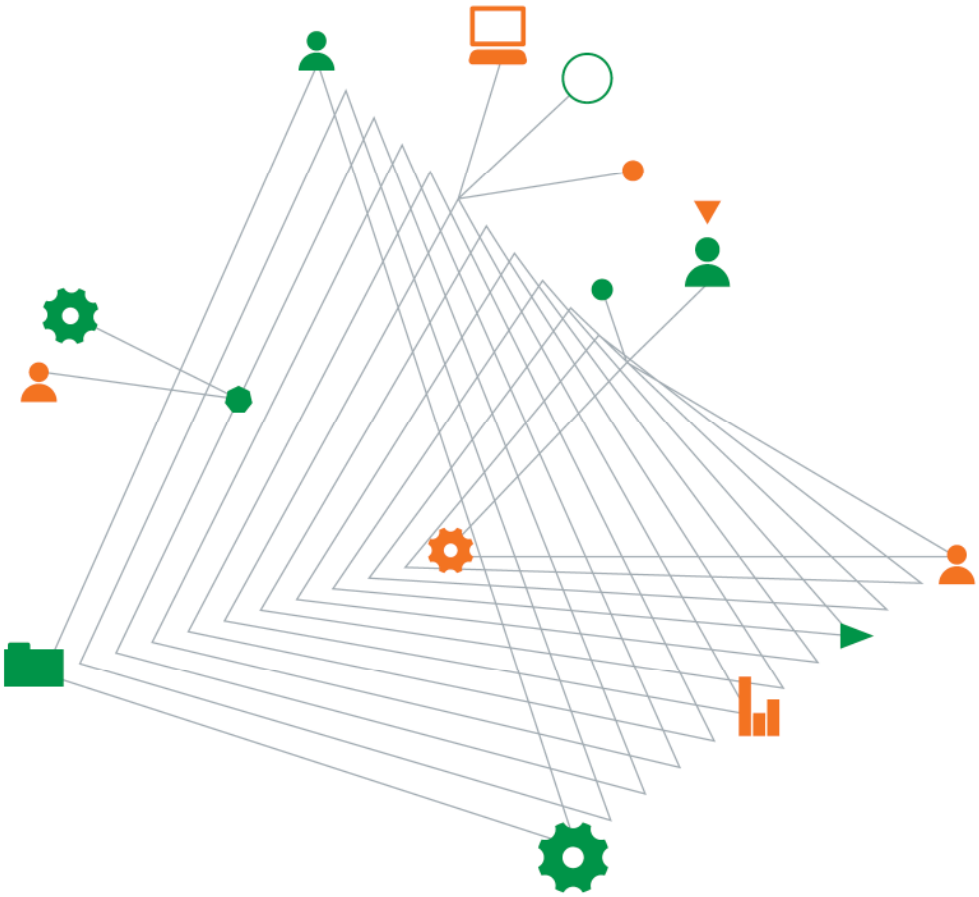
coffey
A TETRA TECH COMPANY

Clough

Perdaman Urea Geotechnical Investigation

Interpretive Report

17 November 2020



Experience
comes to life
when it is
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expertise

Perdaman Urea Geotechnical Investigation

Prepared for
Clough

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17 November 2020

Document authorisation

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For and on behalf of Coffey

Sean Eyre
Associate Geotechnical Engineer

Quality information

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Appendices

Appendix A Indicative Plans

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Appendix C Geophysical Testing Results

Appendix D Laboratory Result Charts

Appendix E Shallow Foundation Charts

Appendix F Fill Requirements

1. Introduction

This report presents interpretive results of geotechnical studies carried out by Coffey Services Australia Pty Ltd (Coffey) for Clough on the proposed Perdaman Urea project located between Village Road and Hearson Cove Road, in Burrup, WA. The findings of this report are also presented in a combined factual / interpretive report dated 7 October 2020 (Ref. 754-PERGE271567-R05).

The geotechnical investigation fieldwork consists of the following:

- 18 Boreholes to a depth of 12m
- 42 Test Pits to a depth of up to 3.0m
- 6 Hand Augered Boreholes
- Seismic Refraction Testing
- Downhole Seismic Testing
- Electrical Resistivity Testing
- Thermal Resistivity Testing

The project comprises the construction of a urea plant and associated facilities within two lots of the King Bay- Hearson Cove Industrial Estate. The plant will be constructed in Site C to the south of Village road which is adjacent to two current facilities operated by Yara. Site F is located to the south on Hearson Cove Road (to be realigned) and will house associated facilities. The two sites will be accessed by a new causeway.

2. Objectives

The objectives of the geotechnical study are to assess the following:

- Soil, rock and groundwater conditions within the significant foundation support zone and at the number of investigation stations specified;
- Assessment of excavatability of ground for bulk earthworks cut and for trenching;
- Floor slab subgrade and design parameters including modulus of subgrade reaction;
- Suitable shallow foundation systems and geotechnical parameters for foundation design, including bearing capacity, unit weight, modulus of elasticity, Poisson's ratio, friction angle and cohesion;
- Suitable deep foundations and parameters including skin friction and end bearing;
- Bearing capacity for various footing dimensions and foundation depths of between 0.5m and 3.0m;
- Recommendations for raft foundations;
- Estimates of total and differential (immediate and long-term) foundation settlement based on the results of the investigation;
- Foundation improvement options;
- Dynamic soil and rock parameters;
- Pavement design parameters and construction requirements;

- Excavation characteristics;
- Earthworks considerations pertinent to the proposed development, including suitability of materials for structural fill and borrow sources;
- Assessment of construction characteristics of in-situ soil and suitability of in-situ soil for reuse as general fill, pond embankments, structural select fill and pipeline trench backfill.
- Stability of cuts and batter slope angles;
- Soil parameters for retaining wall design;
- Surface drainage and soakways;
- Groundwater aggressivity to buried structural elements;
- Erosion and slope protection;
- Electrical resistivity;
- Thermal resistivity;
- Earthquake load design parameters including seismic site factor according to AS1170.4;
- Advice on allowable bearing capacity due to transient loads such as wind and seismic.
- Recommendations for crane support; and
- Identification of geotechnical risks.

3. Available Information

3.1. Publicly available information

The following sources of information are available as public resources

- 1:250,000 geological map and notes (Dampier – Barrow Island)
- 1:100,000 geological map and notes (Dampier)
- 1:50,000 geological map (Nickol Bay)
- Historical aerial photography from Google Earth and Landgate

The 1:250:000 mapping describes the site as being one of two units below:

- AyG (high elevations) Gidley Granophyre
- Qc (lower elevations) Colluvium, sand, silt and gravel

The 1:100:000 mapping describes the same units, with an additional unit within the tidal zone:

- Qhmu – Silt and mud in supratidal to intertidal flats and lagoons

The 1:50:000 mapping describes the units in a different notation due to being produced earlier:

- Pa – Granophyre (equivalent to AyG)
- Qps - (equivalent to Qc)
- Qhm – (equivalent to QHmu)

A curved thrust fault is also shown as extending through Site C, which is interpreted as very old (>2 billion years) and inactive. The alignment of the fault somewhat reflects the topography but doesn't exactly match surface features.

Aerial photographs at various intervals are available since 2000, with one previous photograph from 1970. The aerial photography indicates that the site has been generally modified only by construction of the known site features. These were generally constructed between available photographs, and hence temporary features were not observable.

The aerial photographs of Site F indicate that the area to the south of Hearson Cove Road has been disturbed in the past. This is believed to have been used as a laydown area during construction of other developments on the Burrup Peninsula, however the previous use of this area is not indicated in the available data.

3.2. Reports supplied by Clough

The following previous reports relating to the site were provided by Clough:

- Geotechnical Desktop Study by SNC Lavalin (140436-0000-4GER-0001 dated 8 April 2019);
- Phase 2 Geotechnical Investigations, King Bay . Hearson Cove and Maitland Industrial Estates by Soil & Rock Engineering (Ref. GG4647_1_00rep dated 9 August 1999).

The Soil & Rock (S&R) report incorporates a desktop study completed earlier that year. The SNC Lavalin report is based on a number of other reports (referenced but not supplied) including the S&R report and environmental studies. That report covers a wide area of potential industrial sites which includes Sites C and F as well as nearby sites and the proposed Maitland Estate which is separated from this project site.

A number of other reports within the area were available in the Coffey archives. A summary of these reports is included in our geotechnical desktop study report (754-PERGE271567-R01).

4. Fieldwork

4.1. General

Fieldwork was completed in three phases from 11 to 31 August, 3 to 5 September and 30 October to 1 November 2020, in the full time presence of personnel from Coffey. The fieldwork includes 42 test pits, 6 hand augered boreholes and 18 boreholes. Borehole locations were set out in advance by Land Surveys to MGA 94 datum.

Water level readings were made in the test pits and boreholes at times and under conditions stated on the borehole logs. The site was accessed via an unsealed track from Burrup Road. Access to some locations required minor clearing by a backhoe.

Approximate investigation locations are shown in Figure 1 (Site C), Figure 2 (Site F) and Figure 3 (Service Corridor). Figures 4 and 5 indicate the locations of Site C and F tests against the proposed site layout. Also indicated on Figure 1 is an aerial photograph composed of Unmanned Aerial Vehicle imagery taken by LandSurveys.

Contour plans of site elevation have been derived based on the access track set out points and are provided in Appendix A. It should be noted that the accuracy of these contours is uneven since the points were not surveyed with the intention of drawing contours. At the test and track locations the

elevation should be accurate, but not necessarily between points. For example the transition between the granophyre flanks and the tidal flats is more abrupt than shown on the contours.

4.2. Boreholes, sampling and testing

The fieldwork includes the drilling of 18 boreholes each to a depth of 12m below existing ground surface using a truck mounted Hydropower or Hanjin Site Investigation Drilling Rig and coring techniques.

Standard Penetration Tests (SPT's) were taken at 1.5m intervals in soils (Note that very little soil suitable for SPTs was encountered in the boreholes) The SPT's were carried out on granular materials to estimate the density index at the test depth.

4.3. Test pitting

A total of 42 test pits were excavated by a 13 tonne excavator to depths varying from 0.7m to 3.0m below the existing ground surface.

Disturbed samples of representative soil types were taken from 20 locations for laboratory testing.

4.4. Dynamic Cone Penetrometer Testing

Dynamic Cone Penetrometer (DCP) tests were carried out at 45 locations to depths of between 0.25m and 1.05m below the existing ground surface. This test is described in AS 1289-1996.6.3.3.

4.5. Resistivity Testing

Electrical and Thermal resistivity testing was carried out by Draig Geosciences (as a subcontractor to Coffey) and consisted of:

- 15 Electrical Resistivity tests using 4-point Wenner array method
- 12 Thermal resistivity tests using thermal needle method

Results of this testing are provided in Appendix C.

4.6. Seismic Velocity Testing

Testing of seismic p-wave velocity was undertaken along three survey lines within Site C.

Cross-hole seismic testing was planned to be carried out between two boreholes at BH05, which had been cased with PVC lining and grouted. Due to intrusion of the groundwater into the second of these holes, the cross-hole seismic testing was replaced with a combination of downhole seismic testing and surface Multi-Channel Analysis of Surface Waves, which combine to provide a profile of seismic shear wave velocity at BH05.

Results of this testing are provided in Appendix C.

5. Geotechnical Model

5.1. Expected Subsurface conditions

Based on the available information, the ground conditions below are expected:

- INTERTIDAL DEPOSITS – Loose sand (Unit 1) and soft to very soft clay (Unit 2) which is recently deposited. Expected to be relatively thin in the project area (<2m) and confined to the periodically inundated parts of the site. Sand is pale brown and likely calcareous with frequent shell fragments. The clay/clayey sand is pale brown, medium plasticity.
- COLLUVIAL GRAVEL (Unit 3) – Fine to coarse, dark brown red, sand and clayey gravel present on the surface of the majority of the site. Colluvium consisting of granophyre boulders is also present at the site. Between 0.3m and 2.0m thick.
- WEATHERED GRANOPHYRE(Unit 4) – Medium to high strength rock, distinctly weathered.
- BRECCIATED/CEMENTED GRANOPHYRE (Unit 5) – Fragments of granophyre which have undergone secondary cementation by calcium carbonate. Distribution is not uniform across the site but has been encountered in multiple locations. Thickness of up to 5.0m has been observed. This unit is likely to be encountered below colluvial slopes which are adjacent to the tidal flats.
- GRANOPHYRE (Unit 6) – Slightly Weathered to Fresh, Very high to Extremely High Strength, blocky with regularly jointing pattern. Encountered at depths of 2.0m to 6.0m.
- CALCRETE (Unit 7) – Pale grey to red rock or gravel, vughy, up to 2.0m thick in exposures but expected to be thinner where it is not exposed.

The Gidley Granophyre (Unit 4 to 6) is the dominant rock type across the Burrup Peninsula and has been encountered in many previous construction projects. It is characterised by extremely high intact rock strength and well defined joints which may be close to vertical, with less frequent jointing at shallow angles. When exposed by weathering the rock surface forms a characteristic surface of boulders that become loose from the rock mass, and may fall partially downhill. The previous investigations near this site indicated a greater degree of weathering than is normal for this unit, which is consistent with the location adjacent an incised channel. The recemented/calcretised granophyre has been encountered in multiple previous investigations along the flanks of the Hearson Cove tidal lowlands.

The intertidal deposits are predominantly sand or a mixture of sand and calcrete gravel. Clay layers are located toward the centre of the tidal flats.

The estimated geological boundaries of the site based on published and available information is indicated on Figure A1 for Site C and Figure A2 for Site F.

Along the service corridor between Burrup Road and the port the natural geological conditions are Gidley Granophyre. The depth of weathering is believed to be generally thinner in this area than at Site C or Site F. The corridor has been subject to previous earthworks to reduce gradient, resulting in significant cuts and fills. The base of significant cut is likely to be fresh rock. The fill is anticipated to be rockfill based on the material which would have been available during its construction.

5.2. Surface conditions

The site occupies an area of 34ha (Site C) and 38ha (Site F). Photographs showing the site conditions are provided in Appendix B.

Site C consists of the flanks of hills trending from North-East to South-West which are topped by loose boulders of Granophyre, the peak of the hill being to the north of the site boundary. The surface conditions on the upper half of the slope consist of a combination of sand, gravel and boulders. Vegetation is mostly grasses (spinifex or leafy) with occasional small trees. The slope of the flanks is generally quite flat. In the west of Site C the hills are within the site, but more subdued than to the east. In many locations there is a ridge of boulders along a line separating the shallower lower flanks from the steeper upper flanks.

The southern part of Site C consists of a tidal flat which is connected both to King Bay and Hearson Cove. The surface of the tidal flats is mostly unvegetated and surfaced with sand or calcrete. The tidal flats appear to be dividable into a regularly inundated section and an occasionally inundated section. The northern, occasionally inundated section has surface conditions which a significant amount of scattered cobbles and occasional boulders (C37), as well as sand banks which are higher than the surrounding tidal flat but lower than the granophyre terrain (eg C31). The edges of the tidal area vary between Granophyre and low height calcrete cliffs (eg. C5). Shelfs of calcrete are noted in the base of the tidal zone (eg C7) indicating that the calcrete is more widespread than the cliffs.

The causeway will cross the southern section of the tidal flats which are very flat and unvegetated due to frequent inundation. The surface is predominantly fine sand

Site F is effectively a mirror reflection of Site C in North-South terms, with the exception that the boundary of Site F does not extend into the tidal flats. The transition from Granophyre outcrop to tidal flat is more gradual in Site F than in Site C.

The following artificial features are present:

- Cleared and formed track running diagonally across the site to the north east, towards Yara facilities;
- Concrete seawater pipeline running along the southern boundary of the site, then approximately north south to/from a water tank (offsite);
- Overhead powerlines;
- High pressure gas pipelines running east-west to the south of the seawater line, and north south to the west of the sweater line.
- The current sealed Hearson Cove Road which runs through Site F;
- A track representing a former alignment of Hearson Cove Road, which is close to the proposed realignment.

Rock consisting of granophyre and occasionally dolerite is present in the form of boulders at many locations around the site. Outcropping is generally confined to higher elevations, which are only within the site boundaries in the western part of the site. The Gidley Granophyre on the Burrup peninsula frequently has three dominant joint sets, with two being at steep angles and a third set at a shallow angle and less frequent. The near vertical joints lead to a strong tendency for toppling (g C21) when the rock outcrops, meaning that the ground surface may be covered with large boulders, and the rock at shallow depths may have separated along joints. Observations of Granophyre outcrop in the west of Site C are consistent with this pattern. Unseparated, tight joints are more rare (eg C17). Because the joints are often separated it is uncommon to have exposed joint sets for which direction can be measured. In the north west steep joints (70-90°) with dip directions of 130 – 160° were observed.

At the north end of Site C is a ridge of Granophyre hills trending towards the north-east. The northern edge of the tidal flats is approximately parallel to these hills. Both of these features approximately follow the orientation of a fault which is inactive but may have been the original source of the change in topography. Between the hill peaks is a colluvial slope which gradually decreases in slope away from the hill. The upper slopes have frequent outcropping, the mid slopes are mainly gravel surfaced and the lower slopes are flat with occasional scattered boulders. There is generally a noticeable

break of slope between the upper and mid slopes which often has a line of boulders. The break also has small trees in some locations, as opposed to the more usual grasses, indicating temporary catchment of water along the break of slope.

The service corridor between Site C and the export facility is asphalt surfaced with concrete kerbs at regular intervals, and is 40m wide. An ammonia pipeline (from Yara) runs along the corridor, which is either central or at one side of the corridor depending on the segment. Gradients are steep, at approximately 10 percent.

Much of site F, on either side of Hearson Cove Road, has been disturbed previously, as seen by altered vegetation and visible rip lines for rehabilitation (eg F03). A former gravel road is also present to the south of the present Hearson Cove Road, with remnants of the former pavement present in some locations (F19) The disturbed area is clearly visible from aerial photography, but the facilities previously present are unknown, as the disturbance happened between known developments. This area is inferred to be a laydown / temporary construction area.

5.3. Encountered Conditions

The conditions encountered to date are broadly in line with expectations based on desktop study, previous work and mapping of the surface. Based on the field investigation the site has a generalised subsurface profile presented in Table 1.

Table 1 – Generalised Subsurface Profile

Unit Number	Layer	Depth to Top of Layer (m)	Layer Thickness (m)	Description/Remarks
1	Intertidal Sand	0	0.8 to 2.2	Pale brown, with sand fragments. Occurs as saturated loose sand or as sand banks
2	Intertidal Clay	0	1.5	Red-pale brown Clay/ Clayey Sand
3a	Colluvium (gravel)	0	0.7 to 3.0	Red-brown, clayey gravel with some cobbles, low plasticity
3b	Colluvium (cobbles)	0 to 1.0	0.3 to 2.2	As above with higher content of cobble/boulder, less range of particles
4	Weathered Granophyre	0.1 to 5.5	2.0 to 4.5	Brown/ yellow with fragments of less weathered granophyre
5	Calcreted / Brecciated Granophyre	5.0	2.0	Grey, white and red. Varied content of SW granophyre in calcrete matrix. Isolated locations adjacent to tidal area.
6	Granophyre	3.0 to 9.5	To max depth	Grey, SW, VHS granophyre with orthogonal joints
7	Calcrete	0	0.5 to 5.0	Sandy gravel as encountered in test pits, also present as rock based on surface elevation
8	Dolerite	0.1 to 0.7	> 2.3m	XW to Residual Clayey Gravel, brown, present in TP20 and TP21.
9	Fill	0	Estimated 0.5 to 2.0m	Gravelly Clayey Sand, brown and white, mixture of granophyre and calcrete

				gravel. Difficult to establish boundary of fill and underlying colluvial gravel

Test pit refusal has been plotted across Site C in Appendix A, A7 (Depth) and A-8 (Elevation). Test pit refusal is an indirect indicator of the depth of rock, although the test pits may penetrate some distance into weathered rock, and depending on size may refuse in boulders. Despite these limitations to accuracy there is a clear trend in the elevation plot, with the refusal surface rising at a consistent angle to the north.

The surficial ground conditions at each of the main structure locations are summarised below:

- Storage Building – Colluvium, generally gravel, some boulders
- Flare Stack – Granophyre near surface
- Ammonia Storage - Granophyre near surface
- Urea Unit 1 – Boulder/Cobble and Gravel Colluvium
- Urea Unit 2 – Gravel colluvium, sand, calcrete
- Urea / Ammonia Substation – Tidal clayey deposits
- Pipe Racks - Gravel colluvium, sand, calcrete
- Ammonia Unit - Gravel colluvium, sand, calcrete
- Air Separation Unit - Tidal clayey deposits
- Demin Plant – Boulder Colluvium
- Seawater Cooling Tower – Gravel Colluvium, Sand
- Power Plant – Tidal clayey deposits

5.4. Groundwater levels

Groundwater levels measured during the course of the investigation are presented in Table 2. The groundwater was encountered at discrete locations across the site where the elevation was low.

Table 2 - Groundwater Elevations

Testpit No.	Depth to Groundwater (m)	Surface Level (mAHD)	Level of Groundwater (mAHD)
TP03	1	2.1	1.1
TP04	1.4	2.5	1.1
TP18	1.8	3.3	1.5
TP23	1.5	2.4	0.9
TP24	1.4	2.2	0.8
TP35	1.9	2.3	0.4

TP39	1.3	2.2	0.9
TP55	2.2	3.9	1.7
TP58	1.6	4	2.4

Three groundwater monitoring wells were installed at borehole locations BH12, BH22 and BH27. Water level readings made in these wells are provided in Table 3 below:

Table 3 – Water level readings from Monitoring Wells

Borehole	Date	Time	Depth to GWL (m)	GWL (m AHD)
BH12	29/8/2020	15:45	0.37	2.13
	30/8/2020	7:30	0.4	2.1
	31/8/2020	11:22	0.43	2.07
	2/11/2020			
BH22	31/8/2020	13:00	5.58	7.32
	2/11/2020			
BH27	29/8/2020	15:40	0.41	2.09
	30/8/2020	7:20	0.45	2.05
	31/8/2020	11:19	0.48	2.02
	2/11/2020			

Groundwater level is expected to be associated with tides. The tidal range was about 2m at the end of August 2020 and 3.5m between peaks at the beginning of November. The measurements indicate that the groundwater response to tides at neap times is very weak.

Groundwater levels measured during the investigation are provided in contours in Appendix A – Figure A-17. In general groundwater is expected to mirror the water level in the tidal flats close to the shore, and an allowance of up to 1m above these levels should be made in design. Water levels in the piezometers installed in BH12, BH22, BH27 and BH31 should continue to be monitored over time during detailed design and construction.

5.5. Laboratory Test Results

Laboratory testing on soil samples recovered from the test pits and boreholes is summarised in Table D1 in Appendix D.

The Particle Size Distribution (PSD) results are plotted on the same chart in Appendix D, Figures D1 and D2. Figure D1 presents each sample individually, while Figure D2 is presented as three geological units representing colluvium (from flanks), calcrete gravel and fill.

In general the following trends are indicated:

- The fines (particle size <0.075mm) content (by mass) of most of the gravel is between 10 and 20%;
- Calcrete gravel is generally finer than the colluvium, but there are exceptions to this trend;

- A very wide range of gravel content is present;
- The proportion of very large particles is shown to be similar. There could be a sampling bias present in this observation. Particles larger than 100mm are difficult to sample by hand and are often a representative proportion is not sampled. At this size a single particle would also represent a large fraction of the sample mass. It is considered likely that samples with a significant fraction larger than 37.5mm would have some >100mm particles;
- The calcrete and lower colluvium gravels typically had similar proportions of sand and gravel, while the upper colluvium samples had very small sand fractions; and
- The two samples of fill from Site F were much finer than the Site C samples.

Atterberg Limits test results are plotted against a Casagrande Plasticity Chart in Figure D3, indicating low plasticity.

Testing on rock included 77 point load index (Is_{50}) and 21 Unconfined Compressive Strength (UCS) results. The results are summarised in Table D2 of Appendix D.

Included in Table D2 is a description of failure mode. The UCS test is designed to break rock in a shear mode diagonally across the sample while the point load index test is designed to break rock vertically through the sample. If the rock breaks in this fashion during the test then the result represents the rock substance strength. If the rock breaks in a different mode then the result is influenced by either a discontinuity/defect or by anisotropy. These results may also be representative of the rock mass but the substance strength would be higher. Very high and extremely high rock sometimes breaks more suddenly in multiple directions ("Exploded"), these results are also valid rock substance strengths. In some point load index tests the sample did not break under the maximum load of the test machine. In these cases the actual point load index is some amount higher than the maximum test pressure.

The results of rock testing are presented in Appendix H as histograms of Point Load Index and UCS. Charts are provided for point load index results on all samples, granophyre samples and weathered granophyre samples, as well as UCS results. For each histogram two versions are included, with categories divided geometrically or based on the strength categories from AS 1726:2107.

For these charts no distinction is made between tests which failed due to intact strength or defect. The lower results could therefore either represent lower fabric strength or small scale defects. Samples which did not fail at maximum load in the point load tests are plotted as the maximum test load.

The results indicate a distributed range of rock strengths, with the point load results on the unweathered horizon being predominantly above 6 MPa. When compared against AS1726 strength categories, the results generally fall into the Very High category. It should be noted that the point load VH results include a number of unfailed samples which could have been EH, however the UCS results were tested to failure and were also generally VHS.

The lowest UCS result obtained (8.46MPa) represents a higher strength rock than some of the point load samples. This is likely due to sample selection, since the rock mass is heavily fractured and lower strength rocks large enough to undertake a UCS test are harder to obtain.

Where both point load index and UCS tests were undertaken on adjacent samples the average ratio between the results was 14, with a fairly wide standard deviation of 5.5. This is reasonably low for an igneous rock, where a ratio of closer to 20 would be expected. This can be explained by the greater size of the UCS sample, making it more likely that the result will be affected by minor defects.

Comparison of the two test results is included in Figure H8, as a direct comparison and as a histogram of the ratio. Linear regression seems to indicate that a ratio of 20 is applicable, but the values are offset.

Rock strength results including tests undertaken in previous investigations are summarised in Figures D9 to D12, as follows:

- D9 – UCS Results – number of tests
- D10 – Is_{50} Results – number of tests
- D11 – UCS Results – percentage of tests
- D12 – Is_{50} Results – percentage of tests

The distribution of tests from the wider set of samples was essentially similar to the tests from this investigation.

5.6. Geotechnical Parameters

The geotechnical parameters in Table 4 can be adopted for the main units on site.

Table 4 – Geotechnical Parameters

Unit Number	Layer	Unit Weight (kN/m³)	Friction Angle ϕ' (°)	Permeability (m/s)	Undrained Shear Strength s_u (kPa)	Young's Modulus (MPa)	UCS (MPa)	Poisson's Ratio
1a	Intertidal Sand	17	34	1×10^{-6}		30		0.3
1b	Sand banks	17	34	1×10^{-6}		30		0.3
2	Intertidal Clay	17	25	1×10^{-7}	5 – 15	5		0.35
3a	Colluvium (gravel)	19	36	5×10^{-7}		80		0.25
3b	Colluvium (cobbles)	19	38	1×10^{-6}		60		0.3
4	Weathered Granophyre	20		2×10^{-6}	200 - 500	100 to 300	3 to 20	0.25
5	Calcreted / Brecciated Granophyre	22		1×10^{-6}		300	2 to 5	0.2
6	Granophyre	24		1×10^{-7}		2,000	30 to 300	0.2
7	Calcrete	20	36	1×10^{-6}		50	1 to 5	0.3
8	Dolerite	22						0.2

6. Recommendations

6.1. General

It should be noted that the ground encountered by the boreholes, test pits and hand augered boreholes represent the ground conditions at the location where the tests have been undertaken and as such are an extremely small proportion of the site to be developed. Accordingly, variations to the ground conditions are likely and allowance should be made for variability in the design and construction budgets.

Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, ground conditions including groundwater levels can change in a limited time or due to seasonal fluctuations. For example fill could be added to a site or surface materials removed from a site that will change the thickness of surface materials and depth to the underlying materials. The potential for change in ground conditions should be recognised particularly if this report is used after a protracted delay.

It is also recommended that any plans and/or specifications prepared which relate to the content of this report or amendments to original plans and specifications be reviewed by Coffey to verify that the intent of the recommendations contained in this report are properly reflected in the design.

6.2. Geotechnical Risks

The geotechnical risks likely to be encountered on the project are summarised below.

Low Strength Soils

The intertidal area of the site contains low strength soils which will have low bearing capacity and will contribute to settlement. The maximum depth of soft soils is likely to be relatively shallow, making several ground improvement options viable including excavate and replace, surcharge pre-loading stone columns. Alternatively the structures could be founded on short piles. Figure A1 indicates the area of the plant likely to be affected by soft soil, marked in green as tidal sediments. Structures included in this area include the Power Plant, Air Separation Plant, 33kV Substation, Clean Steam Water Pond and Control Room. It should be noted that the northern part of the tidal zone appears not to contain soft clay layers, which are confined to the centre of the channel below the causeway.

High Strength Rock

The site is underlain at depth by extremely high strength granophyre. The surface of the granophyre will be weathered and fractured, however the maximum trench depth indicated exceeds the expected depth to fresh rock. In the fresh condition the granophyre formation on the Burrup Peninsula (Gidley Granophyre) is extremely high strength, with UCS results of over 200MPa being recorded on projects in our archives, including in the area of this project. For rock of this strength, excavation by ripping will only occur through separation of the rock along joints. This may be possible at shallow depth, but is constrained by geometry as excavation depth increases. For deep excavations blasting is likely to be required.

Open Structure / Collapse potential

The surface of the Gidley Granophyre weathers to form an open boulder structure where largely unweathered rocks are separated along joints, with significant voids between them. The end stage of this weathering can be seen at the top of the hills of the Burrup peninsula, with a structure which approximates a soil with extremely large grain size. Along the flanks of the hills, the separation may cause the top surface of the rock to be unstable. An example in an outcrop where the rock fragments

are loose but still attached is shown in Appendix B, C21. The loose rock fragments may require removal prior to placement of foundations, resulting in additional excavation requirements.

Dolerite Dykes

The granophyre on the Burrup Peninsula is intersected by linear dolerite dykes which exhibit greater rates of weathering and erosion. The depth of soil cover over these dykes may be significantly greater than the cover over granophyre. Structures which are founded partly over the dykes could experience greater settlement as a result. The settlement of the dykes would not be expected to be large, however the contrast between moderate and negligible compression would result in differential settlement for the structure. The alignment of the dykes is fairly prominent at the top of hills where the Granophyre outcrops but is not visible at lower elevations. It is reasonable to assume that the dykes that are visible between outcropping continue into the lowland areas. The investigation for the Methanex project targeted the locations of submerged dykes identified by magnetic survey, which confirmed their presence. Depth of weathering was observed to be approximately 3m deeper than the adjacent Granophyre. The estimated locations of Dolerite dykes are shown on Figure 3.

An assessment of the investigation locations is that Dolerite dykes have been intersected in the area of a prominent depression in the hills north of Site C, and a smaller depression in the hills south of Site F.

6.3. Shallow Foundations

6.3.1. General

The ground conditions outside of the tidal flats are suitable for the use of shallow foundations provided that unstable boulders in the near surface are removed and recompacted.

Bearing capacity has been plotted for shallow pad and strip footings of various dimensions in Appendix I. The capacity is presented in terms of allowable bearing capacity for working stress, and ultimate limit state (ULS) bearing capacity. The allowable capacity is presented with a factor of safety of 3.0 and with an upper limit on pressure to ensure that settlement assumptions are valid. The ULS capacity used a geotechnical reduction factor of 0.45 and is uncapped, the unfactored applied pressure under sustained conditions should not exceed the working stress cap.

Charts are provided for three material types:

- Gravel in the form of natural colluvium or structural fill;
- Sand within the tidal area (including high groundwater level);
- Fill located in Site F;
- Sand banks (after compaction).

Settlements of less than 10mm can be expected for foundations on rock or on shallow compacted fill over rock.

6.3.2. Raft / Mat Foundations

For shallow footings of greater than 5m in width, settlement criteria is likely to govern. To maintain assumptions on elasticity of soil, applied pressure should not exceed the following:

- Colluvial gravel, Structural Fill or Weathered Granophyre – 400kPa;
- Tidal Area Sand – 200kPa;

- Existing Fill on Site F – 250kPa;
- Sand Banks – 300kPa;
- Granophyre (SW-Fr) – 500kPa.

Subgrade reaction moduli for varying footing sizes and conditions are provided in Table 5.

Table 5 – Subgrade Reaction Modulus for Raft / Mat Footings

Footing Width (m)	Gravel over Weathered Rock	Northern Tidal Area
5	11.1 kPa/mm	3.6 kPa/mm
6	9.8 kPa/mm	3.0 kPa/mm
8	8.3 kPa/mm	2.5 kPa/mm
10	7.6 kPa/mm	2.2 kPa/mm

6.3.3. Horizontal Resistance

Horizontal resistance of shallow footings can be calculated using the following relationships:

$$Ru_H = 0.8 * W * \tan \phi' \quad \text{(Cast in-situ footings)}$$

$$Ru_H = 0.6 * W * \tan \phi' \quad \text{(Pre-cast footings);}$$

Where Ru_H = ultimate horizontal resistance;

W = Weight of footing and overburden;

Design resistance for sliding is 50% of ultimate resistance for sliding (ie. Factor of safety is 2.0).

For overturning resistance a factor of safety of 1.5 should be used.

6.3.4. Specific Footings

The pipe racks are expected to impose a load of 300kN, and will be built over a number of different geological conditions including the lower flanks of the granophyre colluvium, sand and sand/calcrete. Based on the gravel condition pad dimensions of 1m x 1m are sufficient at an embedment depth of 0.5m, while dimensions of 1.5m x 1.5m could be used for the sand condition. Differential settlement could occur between the varying conditions, however this could be mitigated by earthworks. The lower lying sand will likely be filled with compacted structural fill, while the colluvium will require preparation to remove boulders prior to compaction. The post-earthworks condition is therefore likely to be more consistent than the current ground conditions.

Transformers are indicated to be founded on square or rectangular footings with load applied by a central column and a perimeter ring. Dimensions range from 3.9 x 3.9m to 7.8 x 5.8m, founded at depths of between 1.2 and 1.5m. For these footings founded in structural fill, allowable bearing capacity would be 400kPa.

Supplied preliminary loads for selected structures are provided below, along with required dimensions based on bearing capacity in structural fill for an embedment depth of 1.0m, and estimated settlement.

Table 6 – Supplied preliminary foundation details and recommendations

Structure	Compression Loads (kN / foundation)				Min Area (m^2)	Est. Settlement (mm)	
	ULS Operating	ULS Wind / Seismic	SLS Operating	SLS Wind / Seismic		A	B
PAR	600 – 1500	700 - 3000	400 - 1100	700 – 2000	4.8	5	25
PAU	1000 - 5000	1000 - 5500	800 - 2500	800 - 2500	13	5	30
R-101			334 – 543		2.25	5	25
C-302			518 - 917		3	5 to 10	30
R-501			683 - 1033		3	5 to 10	35

In the above table the estimated settlement A refers to footings in structural fill overlying colluvial gravel. The estimate B refers to footings above to fill above the northern section of the tidal flats. The B estimates are likely conservative, as the ground conditions here contain calcrete rock and gravel intermixed with the sand.

Long term settlement is expected to be negligible in A conditions, and relatively small in B conditions.

The product storage at the port is located within a former quarry. Ground conditions at the base are high strength SW-Fr Granophyre which is a significant depth into the profile. A bearing capacity of up to 1.0MPa is considered appropriate for bulk storage or foundations cast directly onto rock. For pre-cast footings a bearing capacity of 500kPa is considered appropriate, to allow for lack of direct contact.

6.4. Deep Foundations

Axial pile capacity is calculated based on the following equations:

$$R_{dg} = \phi_g . R_{ug} > E_d$$

$$R_{ug} = f_s . A_s + f_b . A_b$$

where: R_{dg} = *Design geotechnical resistance*

ϕ_g = *Geotechnical reduction factor (0.4 to 0.9)*

R_{ug} = *Ultimate geotechnical resistance*

E_d = *Structural Design Actions*

f_s = *Unit shaft friction*

f_b = *Unit base resistance*

A_s, A_b = *Area of shaft and base respectively*

If deep foundations are used, it is anticipated that they would develop the majority of their strength within rock, either as bored piles or a rock socketed driven pile. If capacity testing is not carried out (typical for rock sockets), a geotechnical strength reduction factor ϕ_g of 0.4 can be adopted.

For piles in rock, the design parameters are correlated with the unconfined compressive strength (q_u). The ultimate shaft friction (f_s) and ultimate end bearing (f_b) are derived using the following equations, based on Zhang & Einstein (1998):

$$f_s = 0.2\,(q_u)^{0.5}$$

$$f_b = 4.5\,(q_u)^{0.5}$$

The design UCS used in the above equations was downgraded to account for rock mass condition.

The friction and end bearing of rock on the Perdaman Urea site are summarised in Table 7 below.

Table 7 – Rock socket capacity

Unit	Name	UCS (MPa)	fs (kPa)	fb (MPa)
4	Weathered Granophyre	2	280	6.4
5	Calcreted Granophyre	3	350	7.8
6	Granophyre	20	890	20

Rock socketed piles should be designed for a minimum embedment of 2.5D into competent rock. Settlement of piles in rock is improved if the serviceability load is carried in friction only, with end bearing capacity used for reserve capacity to meet ultimate limit state loading.

6.5. Causeway

The causeway linking Site C and Site F will be constructed over soft clay which is expected to be thin. A preliminary estimate of consolidation settlement expected under the proposed fill has been made based on consolidation parameters from previous investigation and the following assumptions:

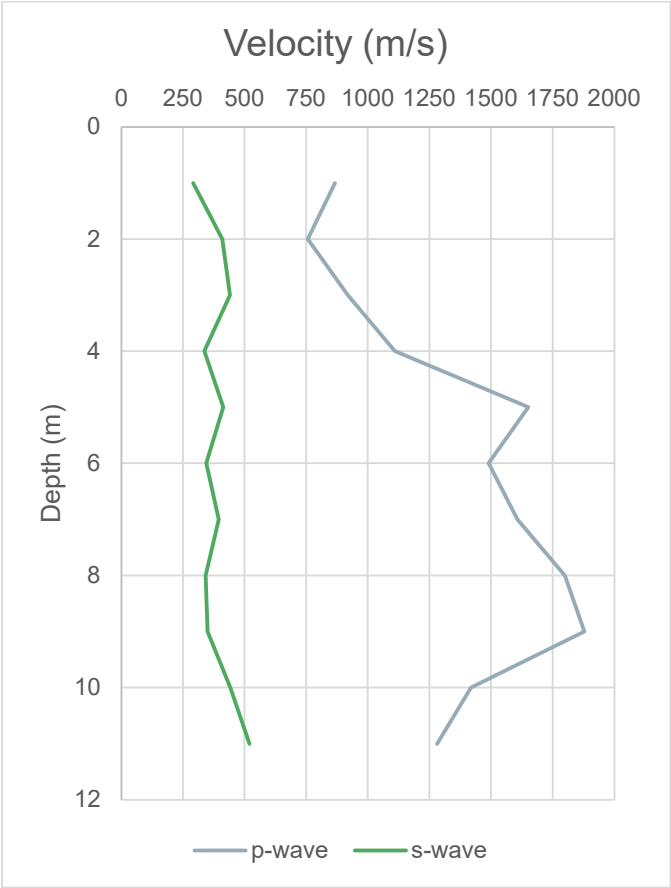
- A causeway fill height of 2m (typical based on supplied earthworks drawings;
- A clay thickness of up to 1.5m.
- Drainage may be either one or two way.

Settlement of up to 50mm was calculated from these assumptions, which will take between 5 months and 1.5 years to occur. The settlement could be accelerated with the use of a surcharge load to reduce the time required for consolidation settlement to be substantially complete.

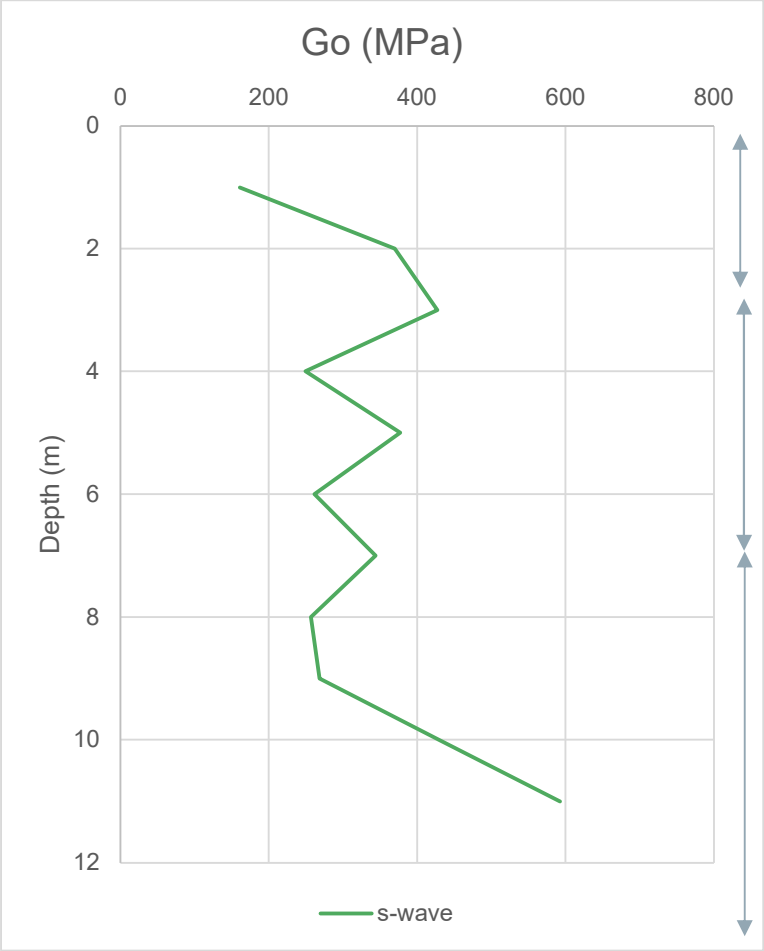
Similar settlements would occur for raising the general site level over the tidal flats by 2m.

6.6. Dynamic parameters

Dynamic shear moduli have been estimated from seismic testing undertaken at BH05. The shear and p-wave velocities recorded with depth are provided in the chart below:



These values can be converted into dynamic shear modulus via the equation $G_0 = \rho . v_s^2$, which provides the chart below:



Soil Types

0 -3

Colluvium (Cobbles)

3 – 7.2

Granophyre

Heavily Fractured

7.2 – 12m

Granophyre (Fr-SW)

This was lower than stiffness derived from testing undertaken for the Burrup Fertilisers project, which is summarised below.

- Colluvium – 120 to 300MPa;
- Weathered Granophyre – 500 to 700MPa
- Granophyre - > 1.8 GPa

Based on these results it appears that the fracturing of the rock mass has a significant effect on stiffness.

The core recovered from BH05 indicates rock conditions that appear better than indicated from the seismic velocity profile, however the adjacent BH05A had more intensive fracturing and weathering. It may be that BH05A better represents the surrounding rock mass which was measured by the downhole seismic testing.

6.7. Earthquake parameters

Based on the site investigation and AS 1170.4-2007 Structural Design Actions - Part 4: Earthquake actions in Australia, the site subsoil class is estimated to be A_e to C_e depending on the area of the site.

A hazard factor (peak ground acceleration for 500 year recurrence) of 0.12 is applicable for the Karratha area based on AS1170.4:2007. The 2012 National Earthquake Hazard Map indicates a substantially lower value of 0.027.

A site specific seismic hazard study was undertaken for the Methanex project. By the standards of seismic hazard study this is very close to the project site. Seismic research undertaken on Australia as a whole since 2002 were not available for that study. The following peak ground accelerations (g) and velocities (mm/s) were estimated for a magnitude of 5.0.

Recurrence interval (yrs)	PGA (g)	PGV (mm/s)
100	0.05	59
500	0.15	
1000	0.2	187

The maximum credible earthquake is considered to be a magnitude of 7.5.

6.8. Retaining systems

Earth retaining structures should be designed in accordance with the requirements of AS 4678-2002. The soil parameters including earth pressure coefficients recommended for the design of the retaining walls are presented in Table 8.

Table 8 - Soil Parameters Recommended for Design of Retaining Walls

Number	Unit	Unit Weight (γ kN/m^3)	Active Pressure K_a	At Rest K_o	Passive Pressure K_p	Young's Modulus E (MPa)
1	Intertidal Sand	17	0.33	0.5	3.0	30
2	Intertidal Clay	17	0.4	0.58	2.5	5
3a	Colluvium (gravel)	19	0.20	0.38	6.2	40
3b	Colluvium (cobbles)	19	0.24	0.38	3.8	30
4	Weathered Granophyre	20	0.20	0.36	7.0	100 to 300

6.9. Pavement Design Parameters

Estimates of subgrade CBR have been based on:

- Dynamic cone penetration tests;
- Correlations with soil classification tests; and

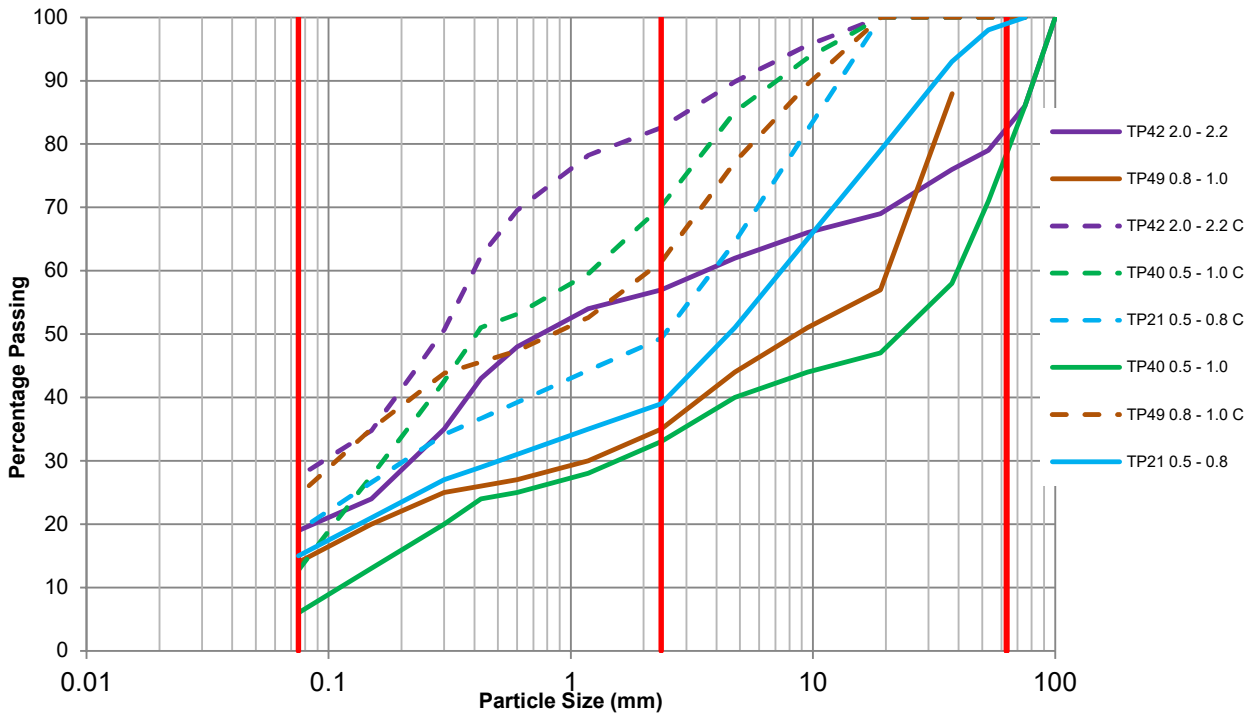
- Regional experience.

The following laboratory CBR results (4-day soaked) have been obtained.

Table 9 – Laboratory CBR results

Sample	Material Type	CBR (%)	% Oversize (>19mm)
TP21 0.5 – 0.8	Fill	25	20
TP40 0.5 - .10m	Gravel Colluvium	50	52
TP42 2.0 -2.2m	Gravel Colluvium	15	28
TP43 0.8 -1.0m	Grave Colluvium	70	59
TP49 0.8 – 1.0	Gravel Colluvium	60	42

Also listed in the table above is the proportion of the sample that was coarser than 19mm and therefore excluded from the test to fit the mould. Particles larger than 19mm are common on this site, and the excluded portion is significant which may under-represent the soil strength. The tests were undertaken regardless since larger particles may be screened out of the sample during construction, leaving a material similar to that in the CBR mould. Despite the excluded material none of the CBR results obtained could be considered poor, and three of the five samples had CBR values in excess of 50%. The effect of oversize can be seen in the chart below, with the solid lines representing the unmodified samples, and the dashed lines representing the sample tested in the CBR mould.



Design subgrade California Bearing Ratios (CBR) for pavement design for the near surface units are summarised below. These are limited to 15% in accordance with typical road pavement design practice:

- Gravel colluvium – CBR of 15%;

- Structural fil – CBR of 15%;
- Intertidal Sand – CBR of 8%;
- Intertidal Clay – CBR of 5%;
- Cobble colluvium – CBR of 15% post earthworks;
- Calcrete – CBR of 15%; and
- Site F fill zone – CBR of 8%.

For design of rigid pavements on colluvium or rock, a modulus of subgrade reaction of 75kPa/mm is applicable for the subgrade in accordance with the relationship in Austroads.

6.10. Drainage

The near surface ground conditions are expected to be high permeability due to the prominence of voids and open jointing. The permeability is likely to reduce with depth as the defects in the rock become closed. Disposal of water by soakage is considered viable at the current surface but will become less effective with proposed cut and fill earthworks which will expose lower permeability rock and replace open structure colluvium with compacted fill.

The subsurface layers generally follow the same profile as the ground surface, hence subsurface drainage will follow the same trend as surface drainage.

6.11. Earthworks

6.11.1. General

Earthworks should be carried out in accordance with the principles set out in AS3798-2007.

6.11.2. Site Preparation

All organic materials and uncontrolled fill should be stripped and stockpiled. This may require secondary screening of topsoil containing boulders or cobbles.

In areas where the colluvium contains boulders, the top 1.0m should be removed and screened of oversize material prior to stockpiling for reuse as structural fill. The exposed surface should then be raked with an excavator equipped with a skeleton bucket to remove the majority of the oversized material.
It is anticipated that the rock cuttings up to 8m in depth will be excavated within jointed, high to extremely high strength granophyre and dolerite. The thickness of overburden is assumed to be minimal.

6.11.3. Rock Cuts

The following construction considerations and recommendations are considered to be appropriate for the construction of cuttings in rock:

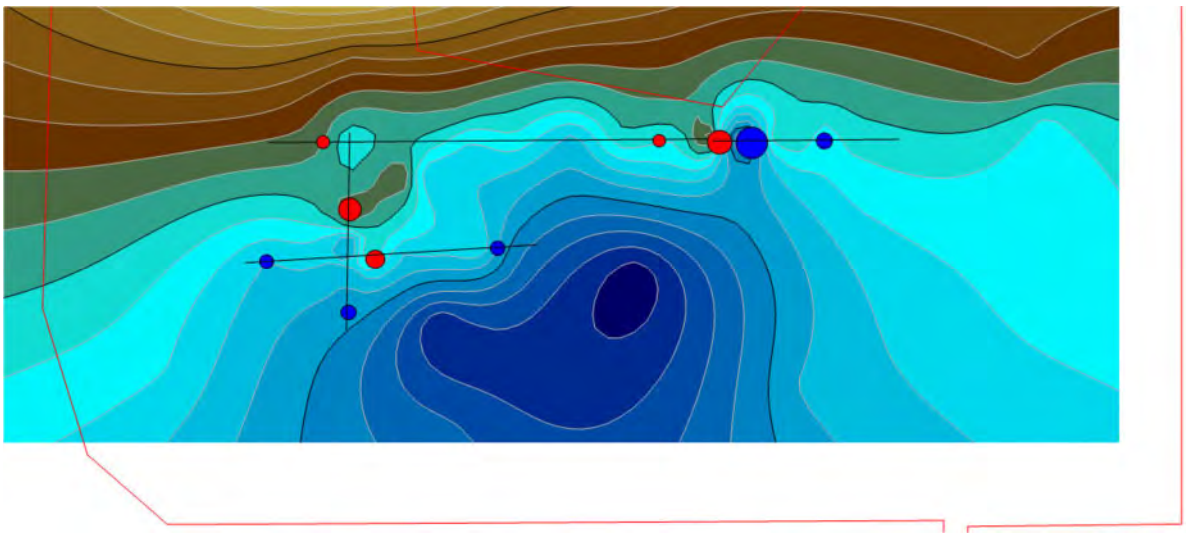
- Boulders and loosely jointed rock should be removed from the surface;
- Weathered and/or calcretised granophyre should be excavated at a slope not steeper than 1.5H:1V;

- Rock excavations in slightly weathered to fresh Granophyre can be constructed at steeper angles which depend upon the orientation of the primary joint sets.
    - Where the cut face runs across joints, a slope angle not steeper than 1V:2H should be adopted.
    - Where the cut face is approximately parallel to the dip direction of a main joint set, cuts in Gidley Granophyre have successfully been cut at steeper angles (1H:4V) which utilise steep (>80 degree) joint faces with occasional steps. Examples of where this approach has been adopted are visible along Burrup and Dampier Roads, and the Rio Tinto Iron Ore rail;
    - The loose surface makes it difficult to determine joint orientation at the surface, however joint sets are persistent over wide areas and can to some extent be interpolated.
- Following blasting and bulk excavation, the rock slopes should be scaled to remove all loose rock and potentially unstable rock.

Excavation of detached or loose boulders can be readily carried out by free-dig. The weathered zone may be rippable. Within slightly weathered or fresh Granophyre excavation will be carried out predominantly by separation of the rock along joints rather than breaking of rock. Excavation to any significant depth of fresh rock will require blasting.

Excavation conditions can be estimated based on p-wave velocities obtained by seismic refraction. For igneous rocks, refusal for conventional excavation (dozer or large excavator) would typically be expected to occur at a p-wave velocity of between about 2,000m/s and 2,500m/s. Where the seismic refraction lines cross close to boreholes, the level of competent rock appears to correspond to a p-wave velocity of approximately 2,200m/s. The typical values therefore appear to correlate well with local conditions.

The seismic refraction survey also indicate a number of area where the depth of weathering was smaller or larger than normal. These are illustrated below, with red marks representing high rock and blue marks representing low rock level. The size of the markers is illustrative of the prominence of the feature (qualitative only). The contours on the chart indicate inferred competent rock level.



6.11.4. Proof compaction

After the site has been stripped to the satisfaction of the Supervising Engineer, the site should be proof compacted using a heavy, self-propelled, smooth drum vibrating roller, capable of operating in variable frequency modes. A Dynapac CA5000PD, or equivalent, is recommended (subject to the protection of adjacent buildings from damaging ground vibrations).

For sand with a fines content of less than 8%, a smooth drum roller should be used. For material with fines content exceeding 8% a pad foot roller will be required.

The following proof compaction procedure is recommended:

- The entire site should be given a minimum of 4 passes with the roller operating in high amplitude mode. A pass should include a minimum overlap of 20%.
- The site should then be given an additional minimum of 4 passes with the roller operating in low amplitude mode.
- All weak areas that deform excessively under rolling, should be removed and replaced with clean sand/crushed limestone.
- On completion of vibratory rolling, 2 passes of the site should be made with the roller operating in a static mode. This will compact the sands in the upper 300mm that were disturbed by cyclic mobility.

It is recommended that the proof compaction be monitored by an Engineer experienced in earthworks.

6.11.5. Fill materials

Based on the project requirements and the available material on site, four fill types have been defined, namely Basecourse, Structural Fill, General Fill and Sand Fill. Particle Size Distribution grading envelopes for these types are defined in Appendix F. The fill should comply with the following requirements:

Basecourse

For use in pavement or heavily loaded applications, basecourse material is to be generally well graded including the following requirements.

- Containing between 4% and 15% by weight, of fractions finer than 0.075mm;
- Containing between 25% and 50% of fraction finer than 2.36mm;
- Maximum particle size of 37.5mm;
- Having a plasticity index less than 10%;
- The linear shrinkage shall not exceed 4.0%;
- 4-day soaked CBR of not less than 60% (80% if used on a sealed road).

Structural Fill

For use as fill below foundations.

- Containing less than 20% by weight, of fractions finer than 0.075mm
- Containing between 22% and 50% of fraction finer than 2.36mm;

- Maximum particle size of 150mm;
- Having a plasticity index less than 12%;
- The liquid limit shall not exceed 35%.

General Fill

For use to increase site level between or outside of foundations.

- Containing less than 30% by weight, of fractions finer than 0.075mm;
- Containing between 30% and 70% of fraction finer than 2.36mm;
- Maximum particle size of 150mm;
- Having a plasticity index less than 18%;
- The liquid limit shall not exceed 35%.

Sand Fill

Can be used as structural fill for relatively light loadings.

- Containing less than 10% by weight, of fractions finer than 0.075mm;
- Containing between 55% and 95% of fraction finer than 2.36mm;
- Maximum particle size of 37.5mm;
- Having a plasticity index less than 4%.

6.11.6. Re-use of Excavated Material

Surplus excavated material from site is likely to fall into one of the following categories:

- Clayey Gravel colluvium. Generally useable as structural fill;
- Colluvium containing boulders. When screened of particles larger than 150mm can be useable as fill. May be useable without screening or crushing if used in deep fill zones. For shallow fill the boulders will require crushing;
- Boulders excavated by free dig from loose rock formations. Will generally require crushing to be used as fill;
- Rock excavated by blasting. The particle size will be determined by the blast design and the excavated material may be suitable for use as fill unmodified;
- Sand (sand banks) – Likely to be suitable as fill but with lower load capacity than the colluvial gravel, and should be kept separate.

Tidal sand and clay, or calcrete are not expected to be available as surplus fill. If available, calcrete can be used as structural fill.

The colluvial slopes are expected to contain an upper shallow zone, a mid zone of deeper gravel suitable for fill and a lower zone of poorly graded soil. This is consistent with surface observations and the limited amount of test pits within the mid-slope (eg. TP42, TP52). There appears to be a well defined boundary between the upper and mid slopes, but not between the mid and lower slopes.

The fill within Site F has a higher fines content than the natural colluvial gravel and the re-use of this material should be restricted to non-critical applications.

A significant amount of cut is anticipated in the southern part of Site F. Four boreholes drilled in the southeast (BHNEW1 to BHNEW4) indicated very different conditions. Significant depth of weathering was encountered in BHNEW1 and BHNEW2, at BHNEW2 there was more than 6m of soil prior to encountering rock. Competent rock was encountered at shallow depths BHNEW3 and BHNEW4. The location of BHNEW1 and BHNEW2 was in a localised depression which is likely related to the increased weathering depth, indicating that BHNEW3 and 4 may be more representative. The rock encountered at the base of BHNEW1 and 2 was possibly dolerite, which may explain the difference in weathering depth. At borehole locations BHNEW1, NEW2 and NEW3 the degree of fracturing of the rock was significant and the rock mass is likely to break up under mechanical working (excavator/dozer).

Further west deposits of surficial colluvial gravel were noted. Historic test pits were present on the slope indicating a depth of gravel of about 1.5m. The gravel is likely to be suitable as structural fill without modification.

6.11.7. Temporary slopes during earthworks

Excavated slopes should be constructed not steeper than IV:2.5H in soil. Rock slopes will no specific design should be constructed not steeper than IV:1.5H in rock. If the slope conditions are verified to be competent Granophyre, this slope can be steeped to 1V:0.75H.

Fill slopes for temporary conditions should not be steeper than 1V:2H.

6.11.8. Permanent Fill Slopes

Permanent fill slopes should be constructed steeper than 1V:2.5H. Slopes above high tide line should be surfaced with compacted gravel. Drainage should be directly away slopes to dedicated drainage areas.

For fill adjacent to the tidal basin which are below the maximum credible high tide, the slopes should be protected with rock armour sized to resist design water velocity. Migration of fines through the armour layer should be prevented by geotextile, a compacted filter layer of intermediate size, or a combination of both.

6.11.9. Preparation of footing bases

Excavations for cast-in-place footings should be to the neat dimensions of the footing as far as practicable, with footings poured against the sides of the excavation. Excavations for pre-cast footings should allow sufficient space for compaction of backfill.

The base of the excavation should be level and free of loose rock. If rock is encountered over part of the footing base and a level surface cannot be obtained, the footing base should be over-excavated and backfilled with compacted structural fill.

The exposure period for footing excavations should be kept to a minimum to avoid moisture ingress and softening of the foundations. For footings placed on clayey soils, a layer of blinding concrete should be placed as soon as practical after excavation.

6.12.Hardstand Capacity and Preparation

The ground conditions on site consist of a combination of boulder colluvium, gravel colluvium, sand, fill or rock. Of these conditions, gravel colluvium is considered to be a suitable condition for supporting cranes, but may require earthworks to provide additional certainty for heavy loading. Rock

outcrop will require cut and fill operations to provide a level surface, after which sufficient capacity for crane loading will be provided.

It is recommended that boulder colluvium is over-excavated to at least 0.5m and replaced with gravel to support crane loading, in order to avoid potential instability associated with voids. Sand surfacing will require a platform of gravel to support cranes.

The load capacity can be increased by compaction of the surface (to at least 94% of Maximum Modified Dry Density) and placement of a compacted gravel hardstand layer.

Preliminary information is provided in Table 10 below for crawler crane tracks and crane outriggers for unimproved ground, compacted ground, 300mm gravel layer and 500mm thick gravel layer. Note that these values are for loading conditions where releasing the load safely is not practical.

Table 10 – Preliminary hardstand bearing capacity

Case	Bearing capacity crawler crane (kPa) (1)	Bearing capacity crane outrigger (1.5m)
Natural Gravel	100	170
Compacted Gravel (min. 300mm) over Rock/Boulders/Gravel	250	400
300mm Gravel over sand	230	180
500mm Gravel over sand	250	250

Note (1) Assumes a track width of 0.6m, the pressure quoted is the average pressure over the loaded area of the track

7. Important information about your Coffey report

The reader's attention is drawn to the important information about this report which follows the main text.

8. References

The following standards and references were used in the preparation of this report.

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AS 1726-2017 Geotechnical Site Investigations.

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1:100,000 Geological Series Map (Dampier)

1:250,000 Geological Series Map (Dampier – Barrow Island)

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Soil & Rock Engineering, Review of Quarry Wall Failure, DPA Quarry by S&R for BGC Contracting (Ref. nb6062_01rep).

Zhang & Einstein (1998) “End Bearing Capacity of Drilled Shafts In Rock”.

Figures

FIGURES

Test Location Plan – Site C – Aerial Photograph Background	**FIGURE 1**
Test Location Plan – Site F – Aerial Photograph Background	**FIGURE 2**
Test Location Plan – Service Corridor	**FIGURE 3**
Test Location Plan – Site C – Layout Background	**FIGURE 4**
Test Location Plan – Site F – Layout Background	**FIGURE 5**
Geophysical Test Location Plans	**FIGURES 6 TO 8**
	(A1 to A3 in Appendix C)

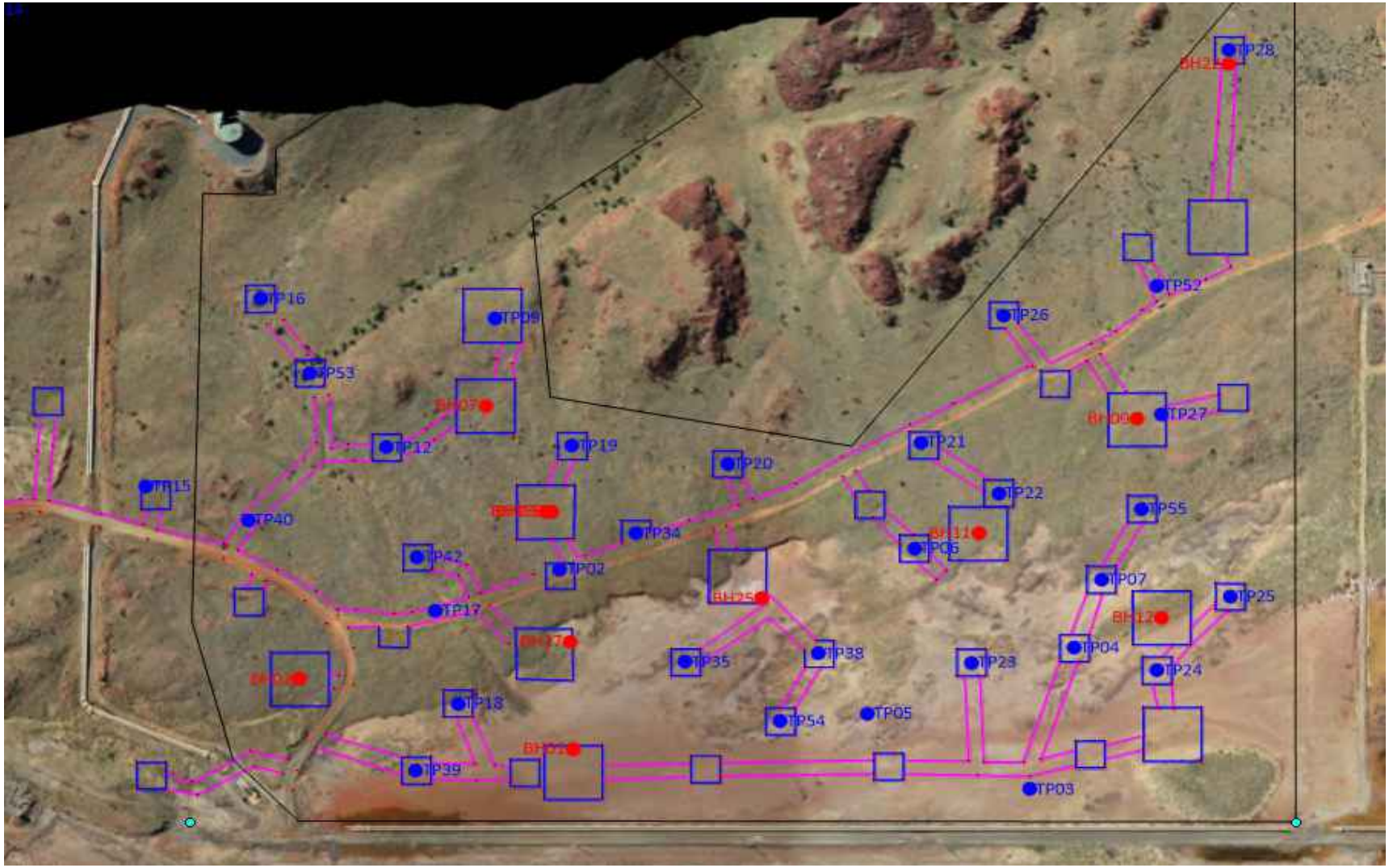

Image Source - **Land Surveys**

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approved			project: Perdaman Urea Geotechnical Investigation
date			title: Test Location Plan - Site C
original size	A4		job no: 754-PERGE271567
Figure	1		

Image Source - **Google Earth**

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approved	
date	
original size	A4
Figure	2

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title:	Test Location Plan - Site F
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Image Source - **Google Earth**

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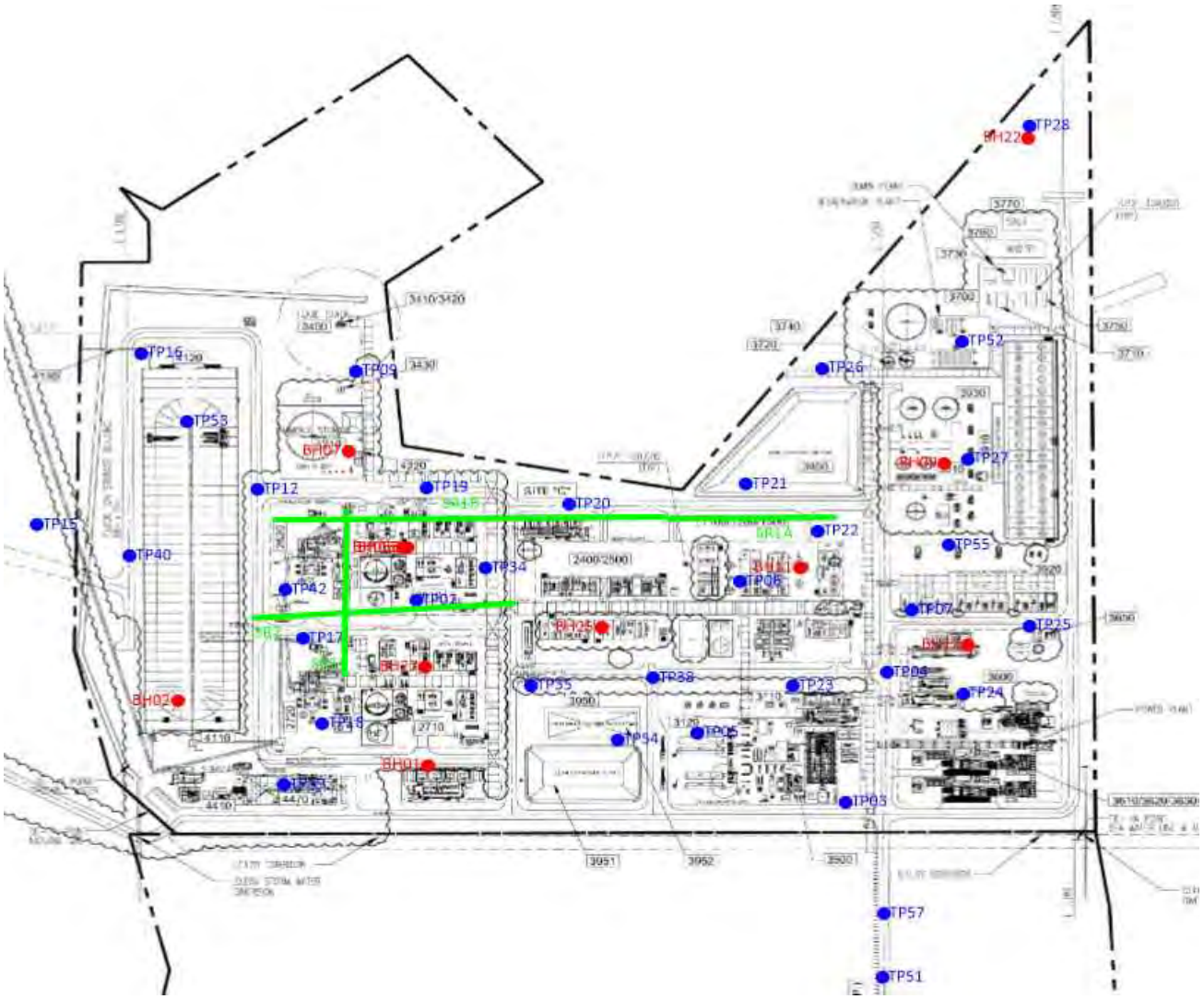
title:	Test Location Plan - Corridor
job no:	754-PERGE271567



Test Pit Location

Borehole Location

Seismic Refraction Line

Image Source - **DWG No. 0000-GB-A-60001 Rev 0D**

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approved	
date	
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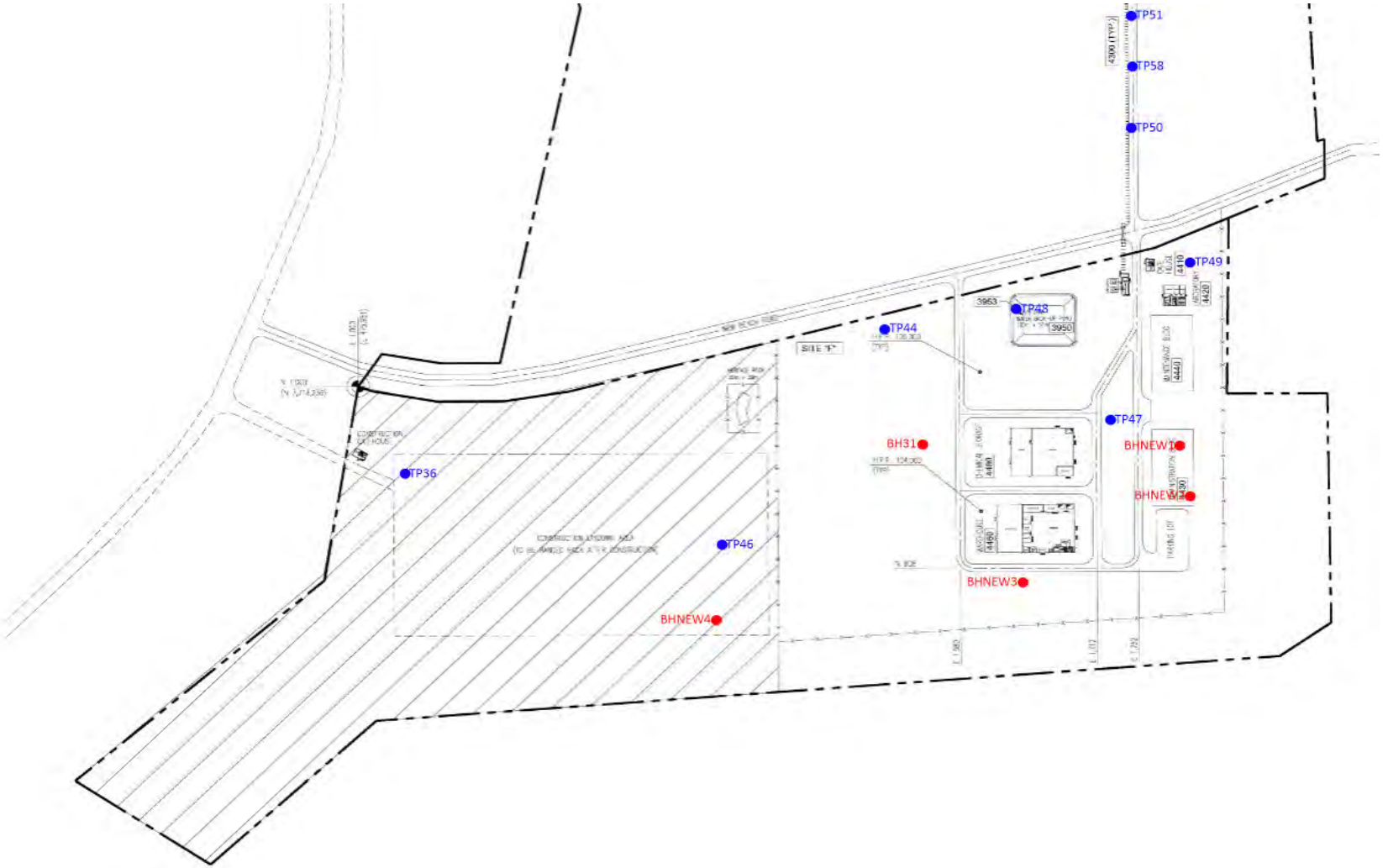

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title:	Test Location Plan - Site F
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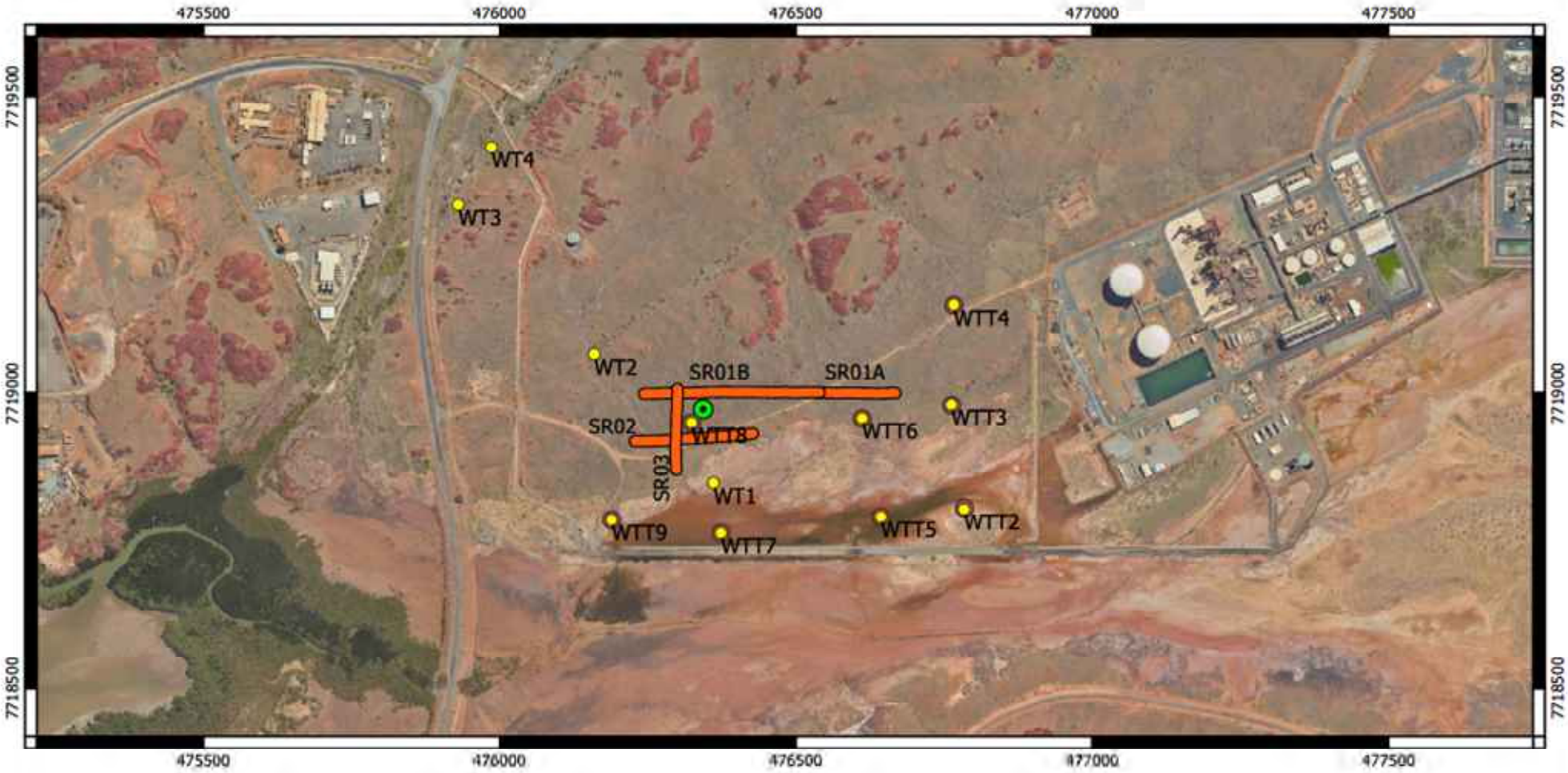

FIGURE 6 (A1)

0 m 200 m 400 m 600 m 800 m

Scale 1 : 10,000

Legend

- Electrical Resistivity
- Thermal Resistivity
- Downhole VSP
- Seismic Refraction

Image Source: Landgate Satellite

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Perdaman Site C

Geophysical Survey Locations

Author: B. Morgan	Date: September 2020
Drawn: B. Morgan	Revised:
Plan No: A1	Report No: DG1662COF_3.0
Projection: MGA50	Scale: 1 : 10,000

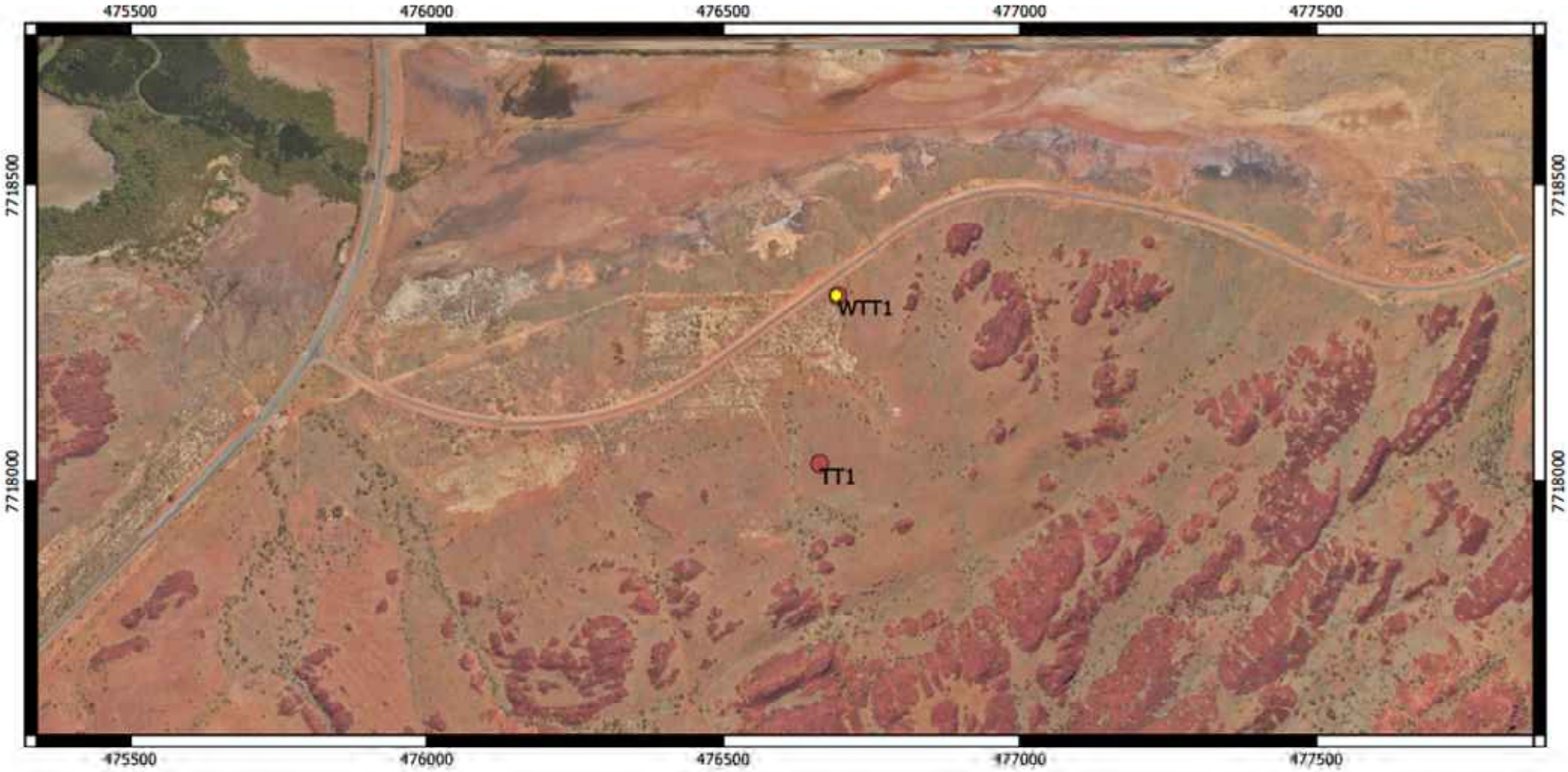

FIGURE 7 (A2)

0 m 200 m 400 m 600 m 800 m

Scale 1 : 10,000

Legend

- Electrical Resistivity
- Thermal Resistivity

Image Source: Landgate Satellite

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Perdaman Site F

Geophysical Survey Locations

Author: B. Morgan	Date: September 2020
Drawn: B. Morgan	Revised:
Plan No: A2	Report No: DG1662COF_3.0
Projection: MGA50	Scale: 1 : 10,000

0 m 200 m 400 m 600 m 800 m

Scale 1 : 10,000

FIGURE 8 (A3)

Legend

- Electrical Resistivity
- Thermal Resistivity

Image Source: Landgate Satellite

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Dampier Port

Geophysical Survey Locations

Author: B. Morgan	Date: September 2020
Drawn: B. Morgan	Revised:
Plan No: A3	Report No: DG1662COF_3.0
Projection: MGA50	Scale: 1 : 10,000

Appendix A
Indicative Plans

APPENDIX A – CONTENTS

Interpreted Geology – Site C	**A1**
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- Gidley Granophyre
- Upper Colluvium
- Lower Colluvium
- Sand Bank
- Low Lying with scattered cobble/boulder
- Sand/Calcrete Flats
- Weathered Dolerite
- Tidal Sediments
- Calcrete Cliff

Imagery - Google Earth

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original size	A4
Figure	A-1

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title:	Interpreted Geology Site C
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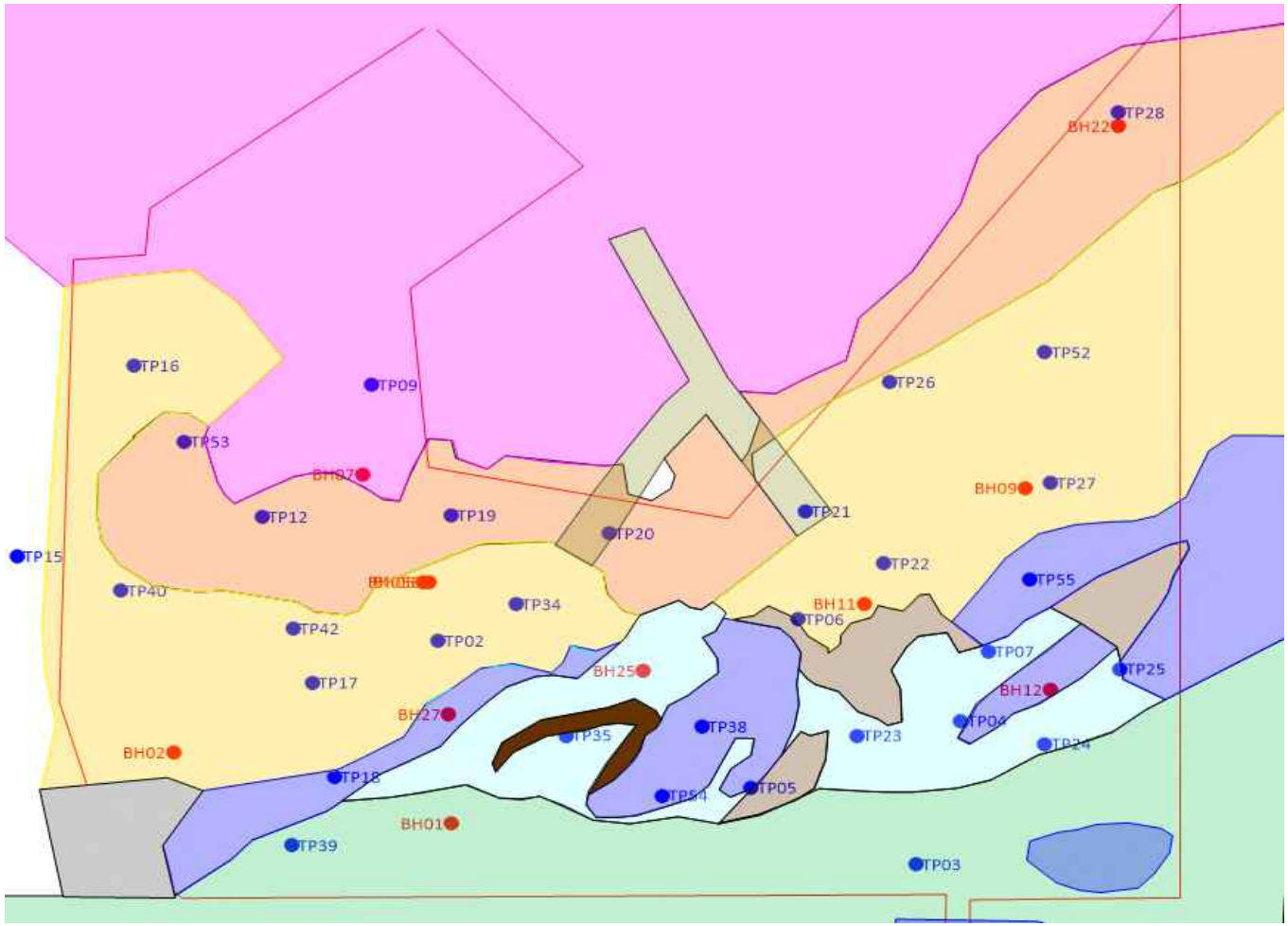

- Gidley Granophyre
- Upper Colluvium
- Lower Colluvium
- Sand Bank
- Low Lying with scattered cobble/boulder
- Sand/Calcrete Flats
- Weathered Dolerite
- Tidal Sediments
- Fill
- Calcrete Cliff

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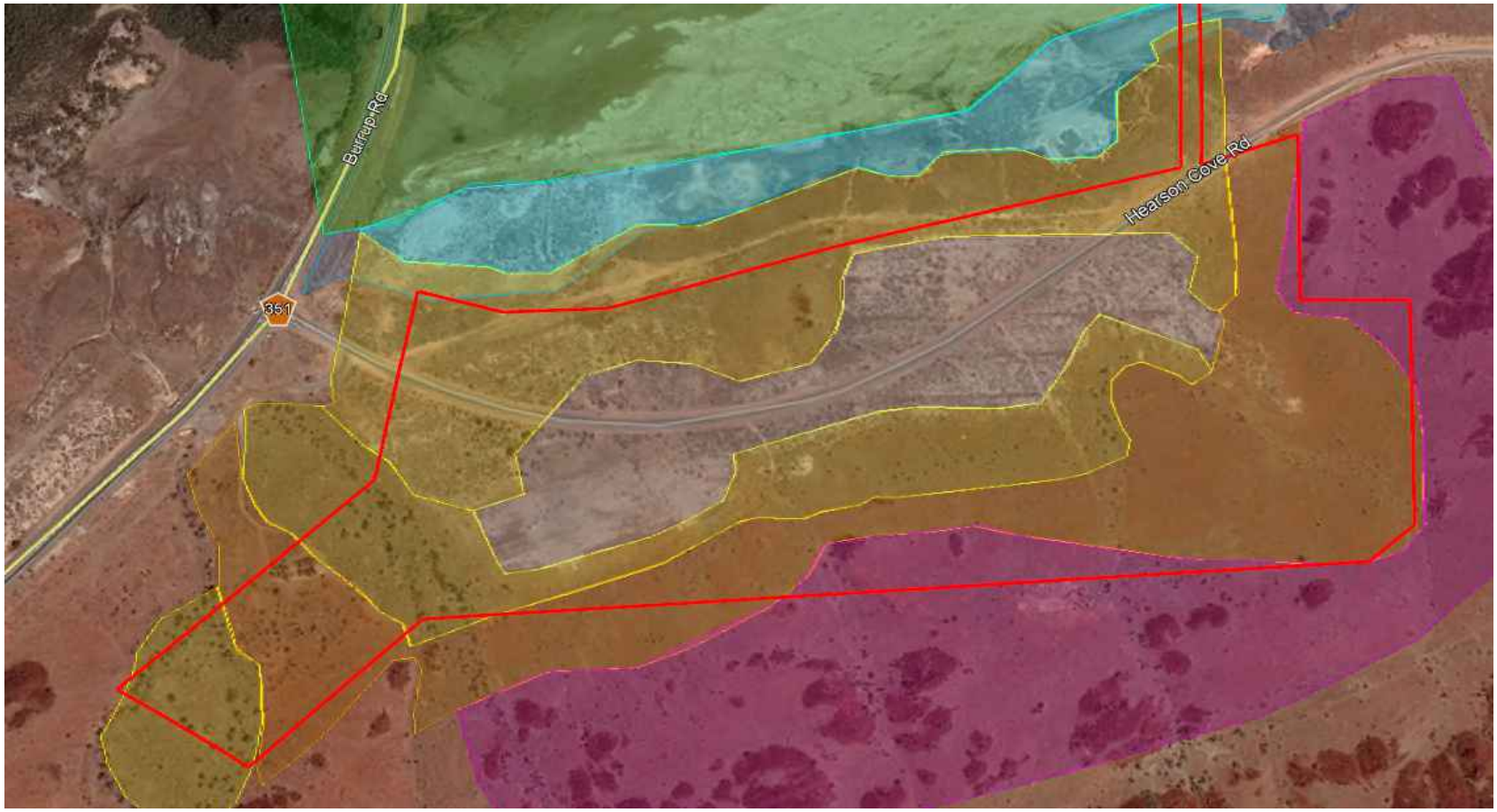

Gidley Granophyre

Lower Colluvium

Upper Colluvium

Fill

Sand/Calcrete Flats

Tidal Sediments

Imagery - Google Earth

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Figure	A-2

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title:	Interpreted Geology Site F
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Lower Colluvium		Gidley Granophyre	
Upper Colluvium		Sand/Calcrete Flats	
Fill		Tidal Sediments	

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approved	
date	
original size	**A4**
Figure	A-2A

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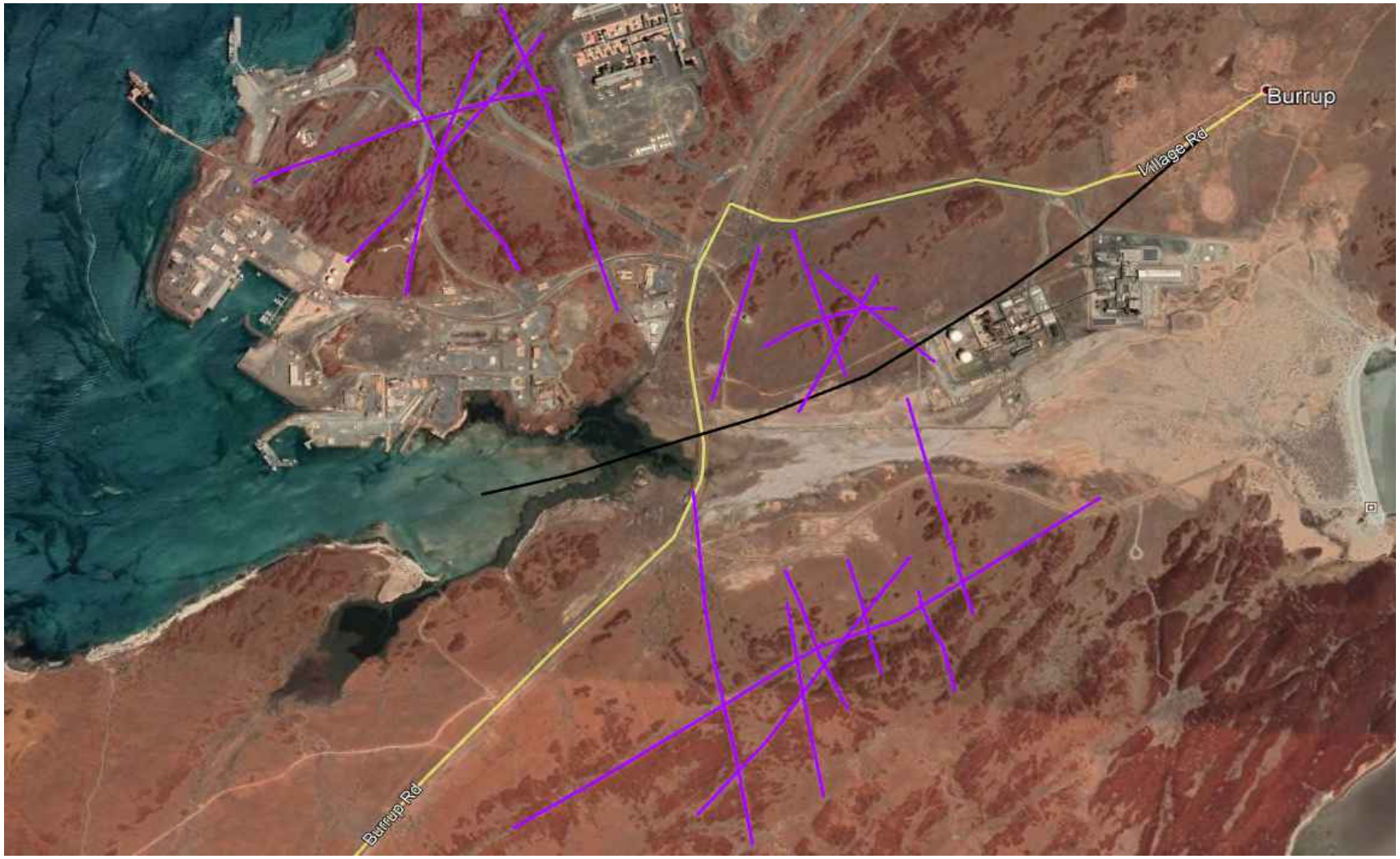

Fault

Possible Dolerite Dyke

Imagery - Google Earth

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Figure	A-3

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title:	Interpreted Structural Geology
job no:	754-PERGE271567

Burrup Fertilisers

Methanex

Service Corridor

Desalination Plant

Plenty River Urea Plant

Imagery - Google Earth

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Figure	A-4

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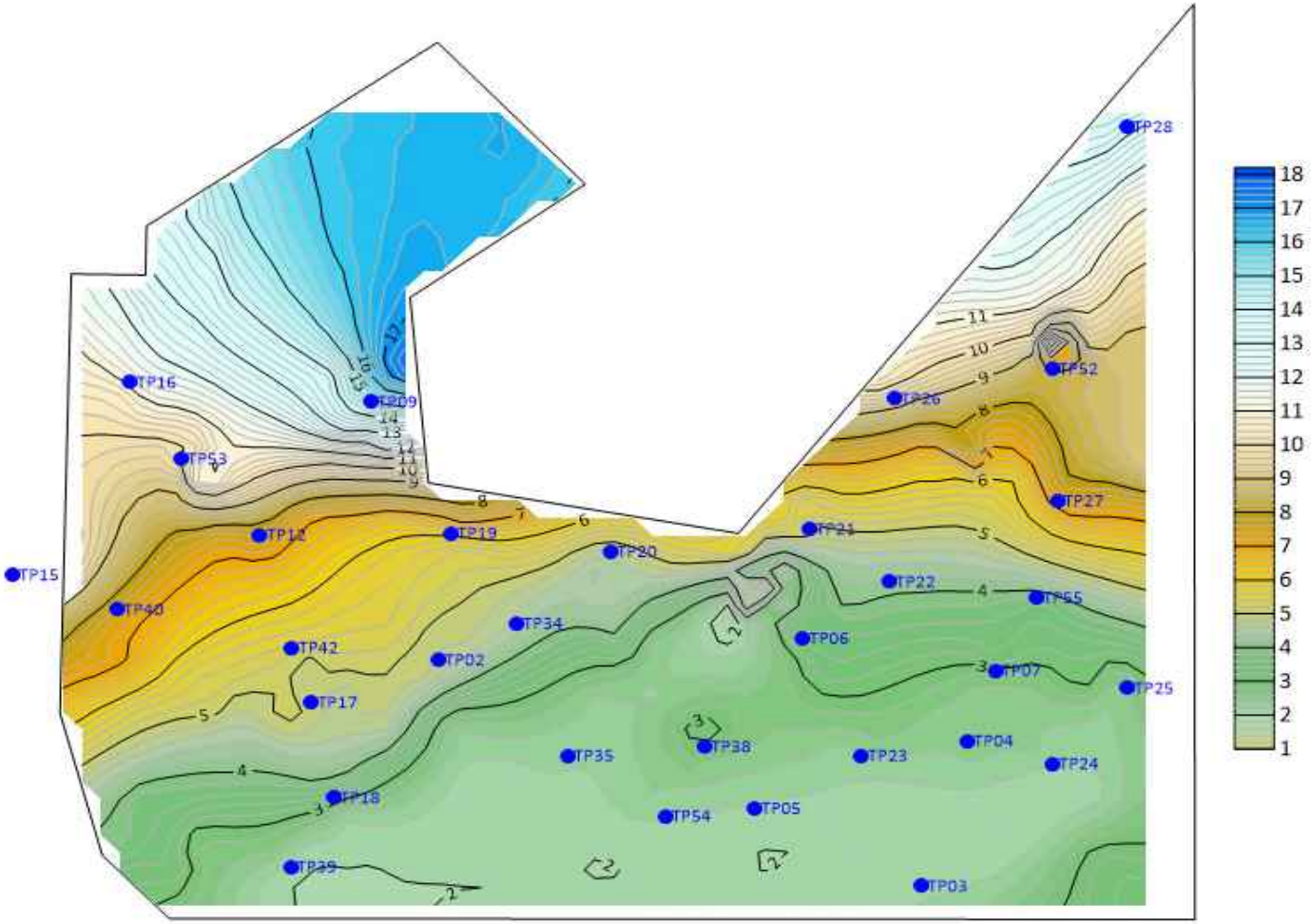

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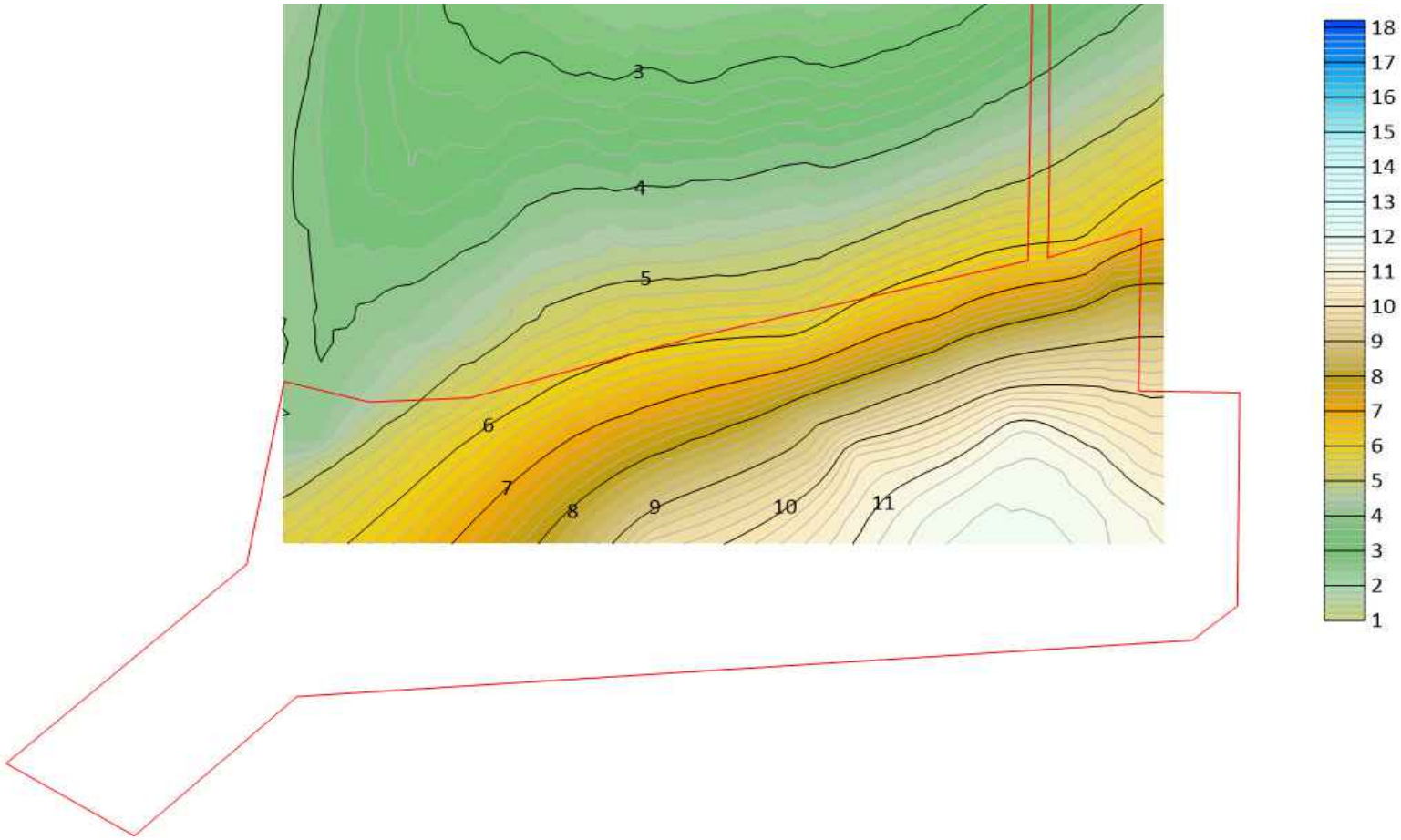

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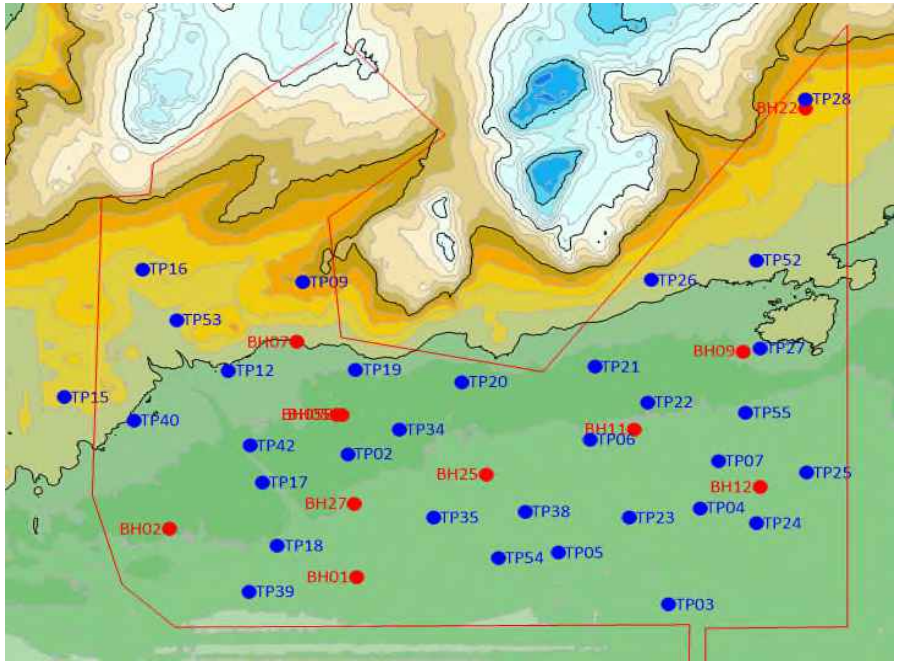

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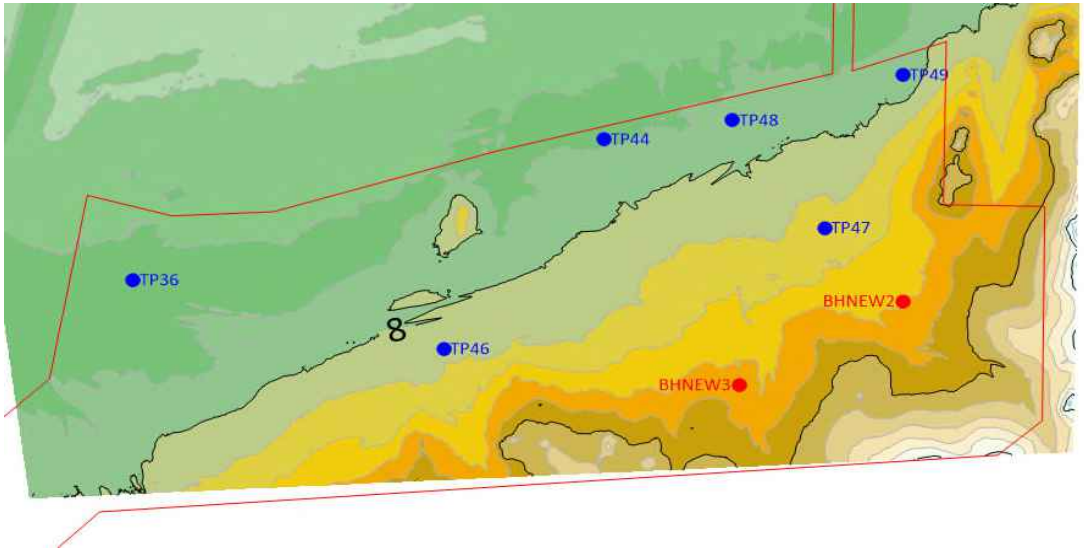
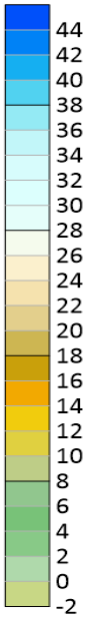


Site F



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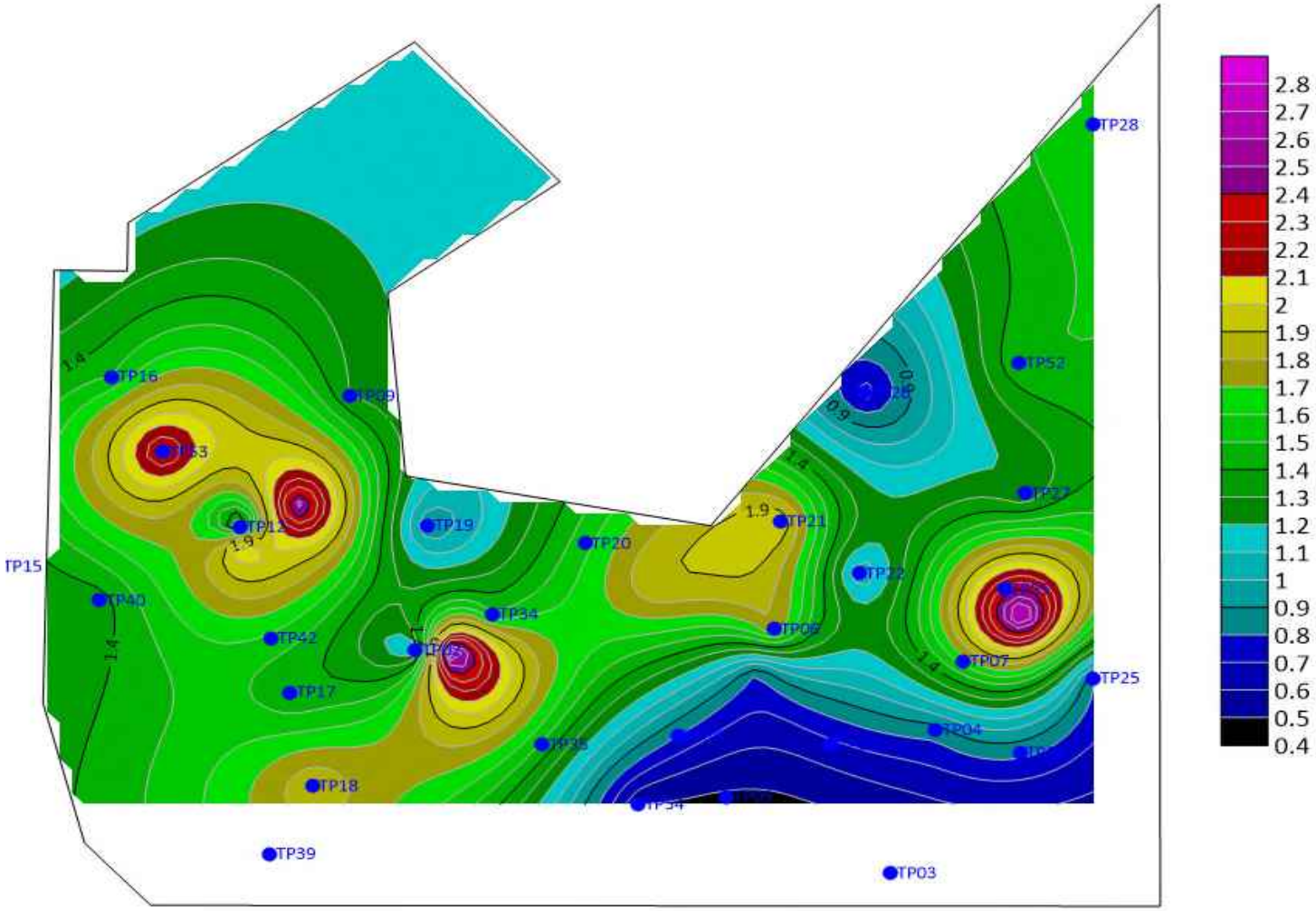

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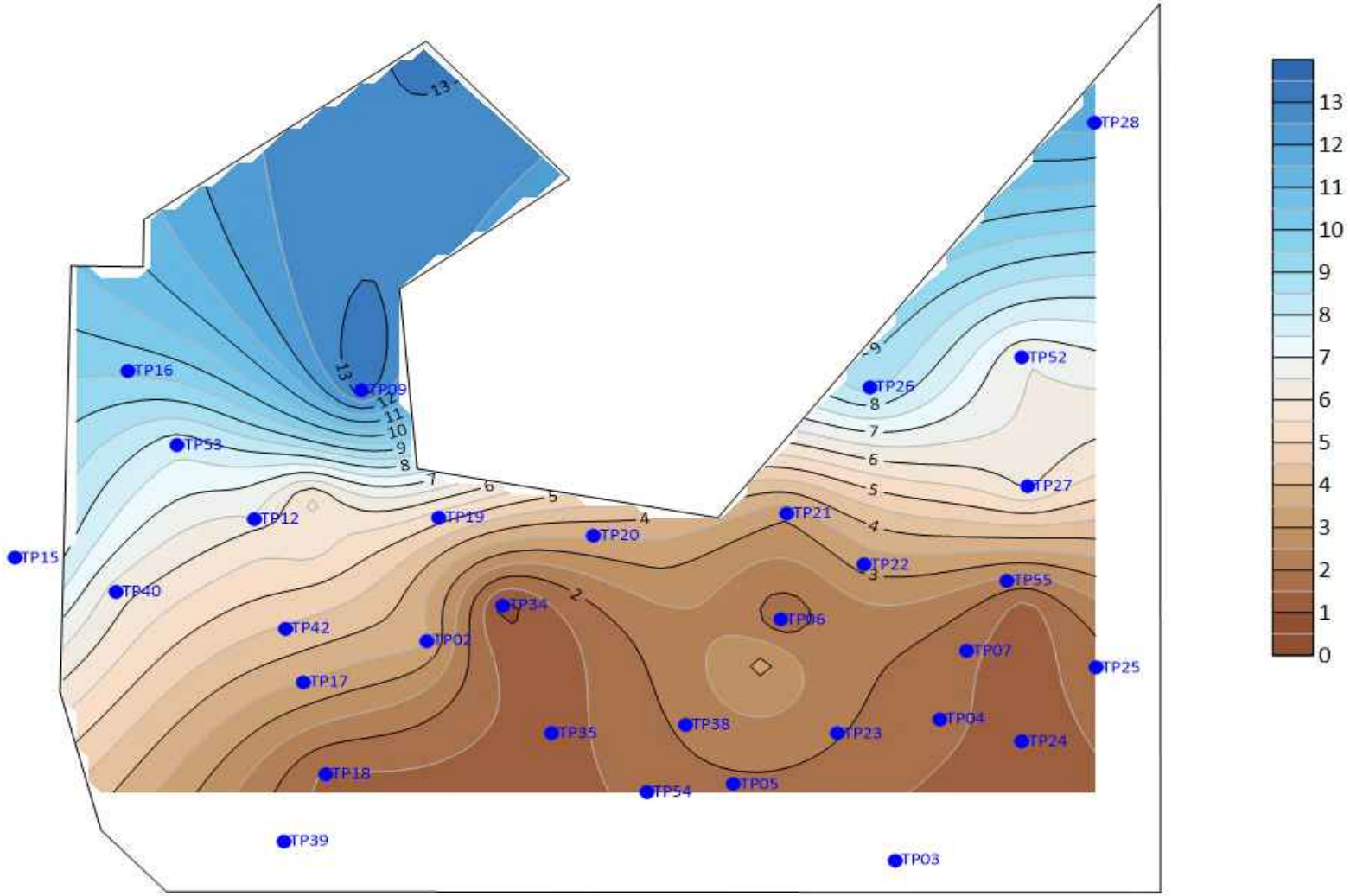

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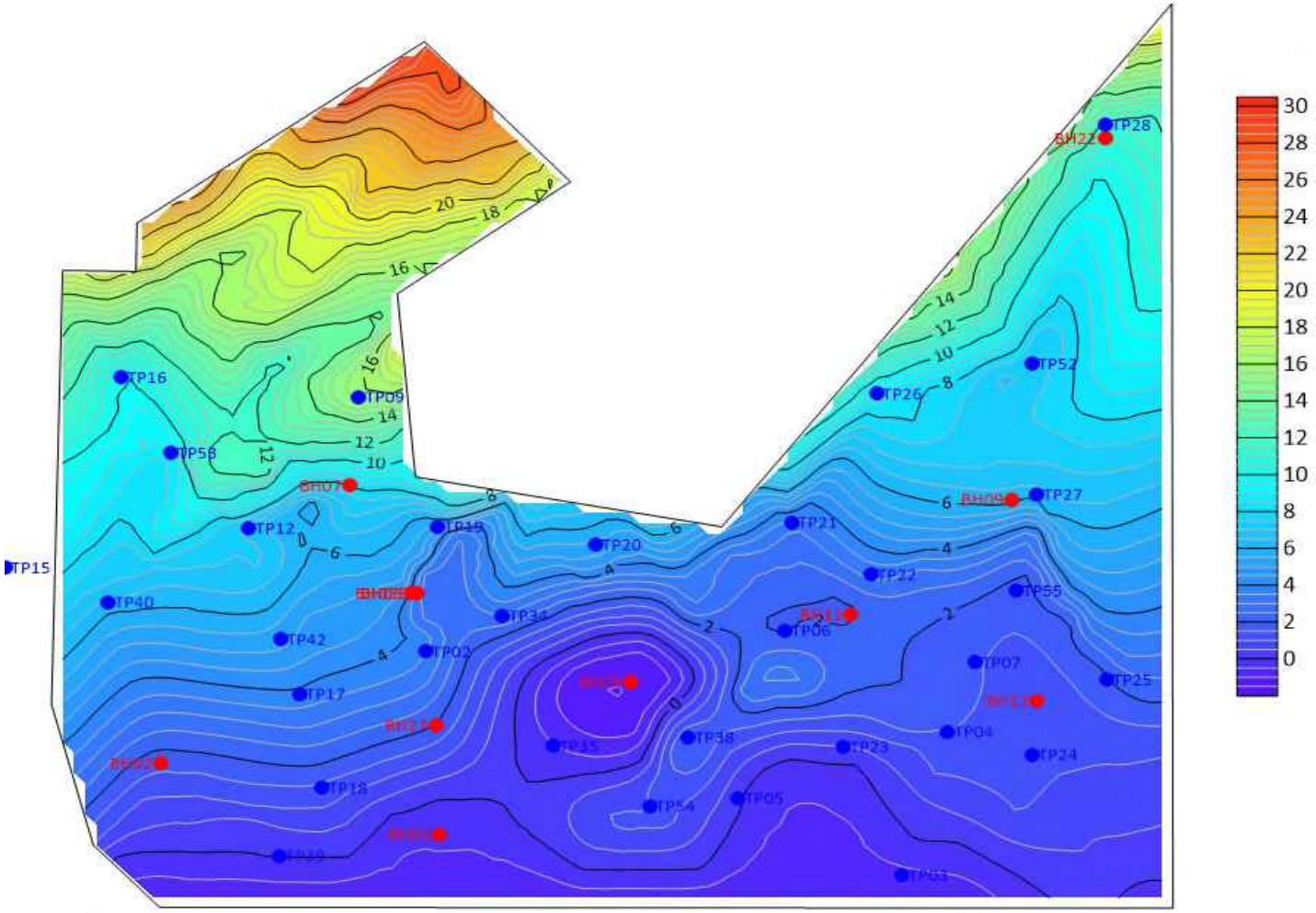

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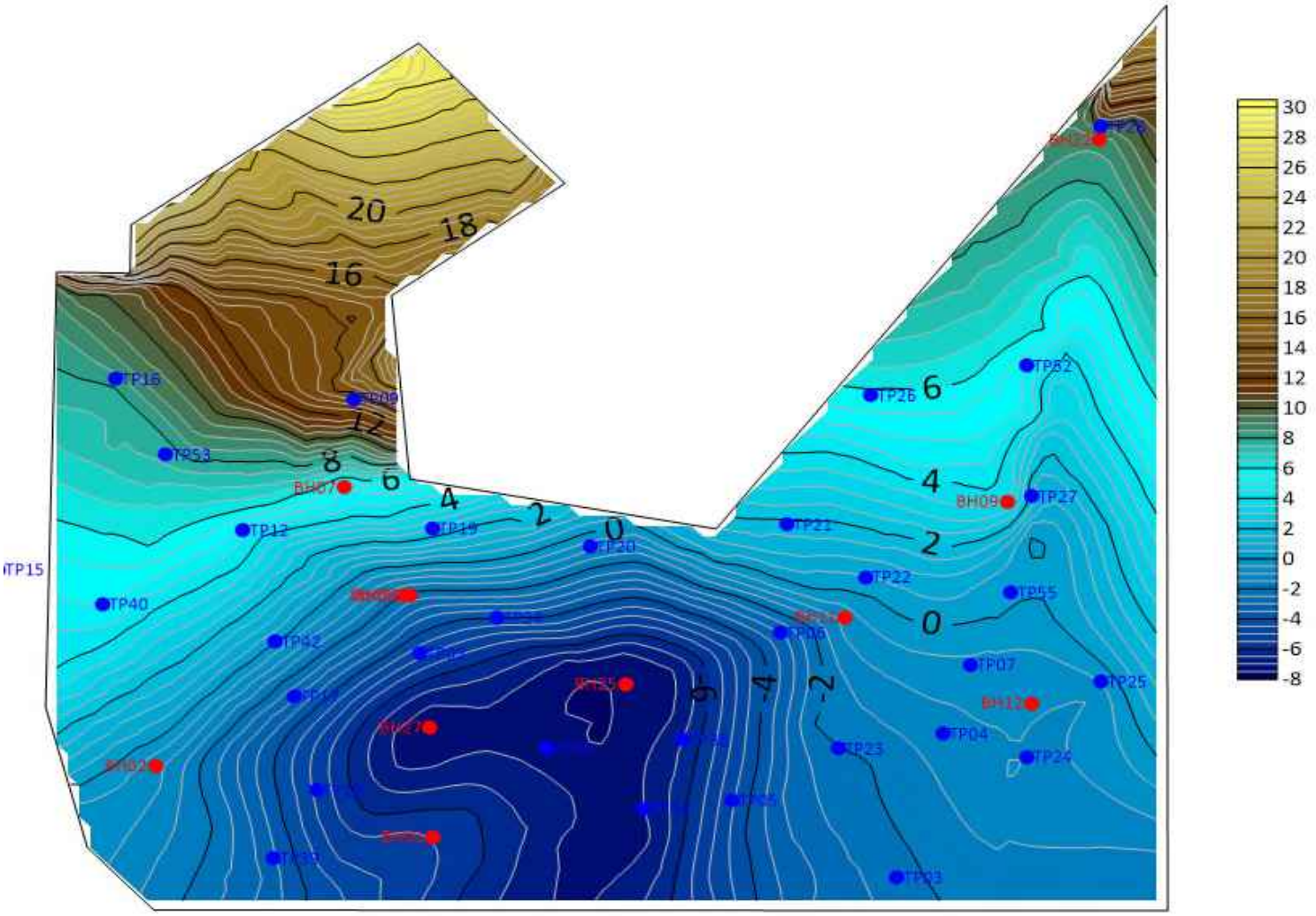

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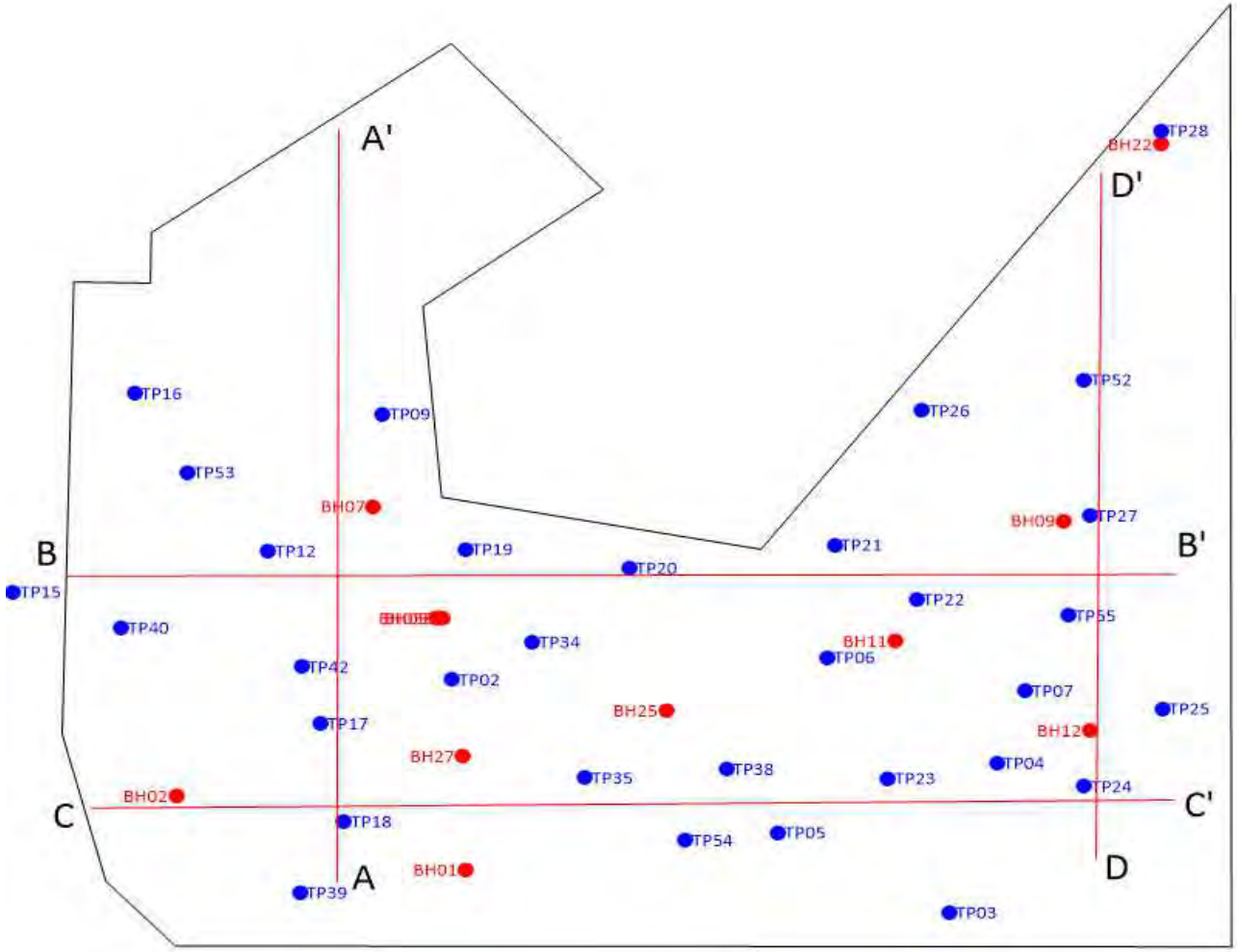

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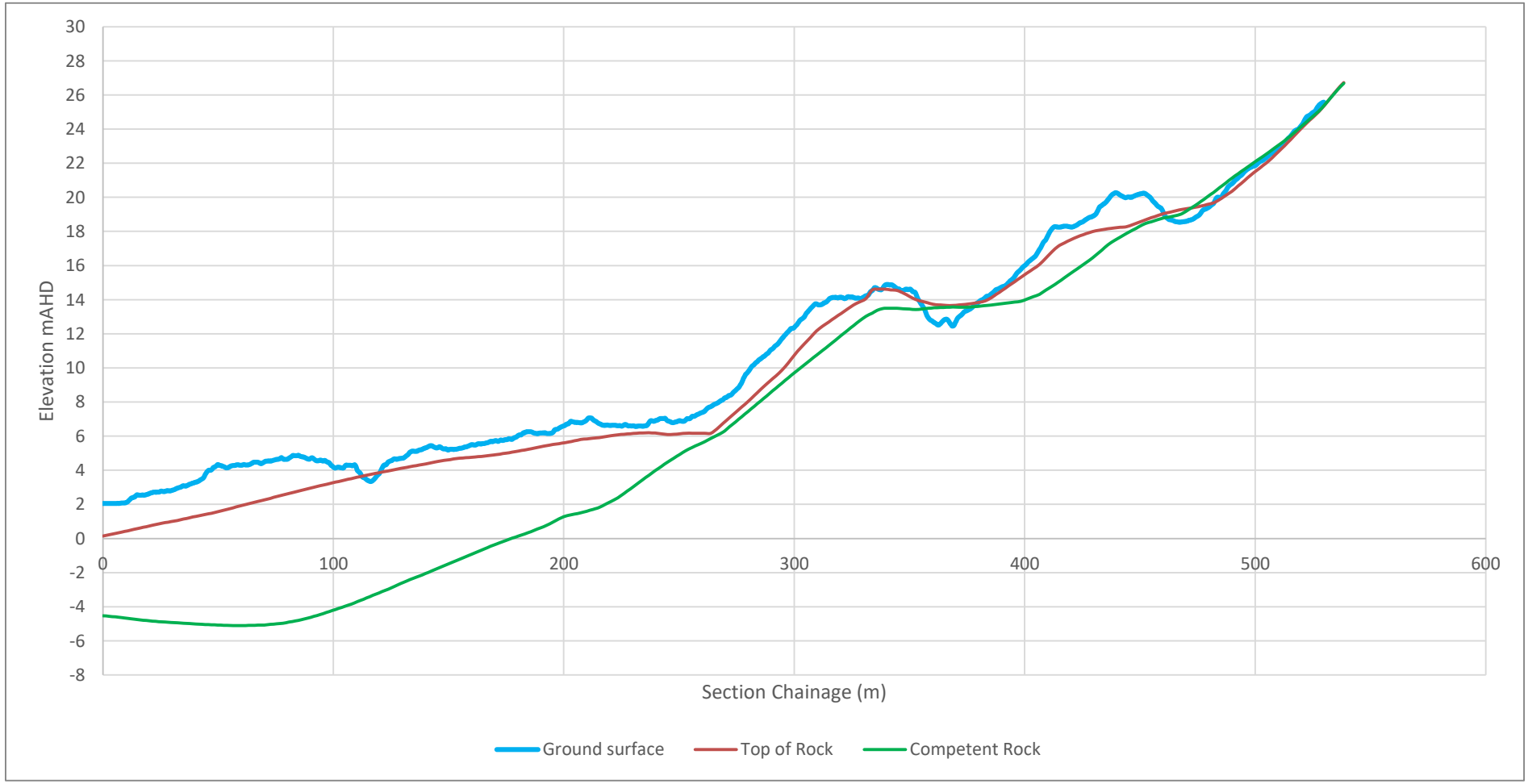

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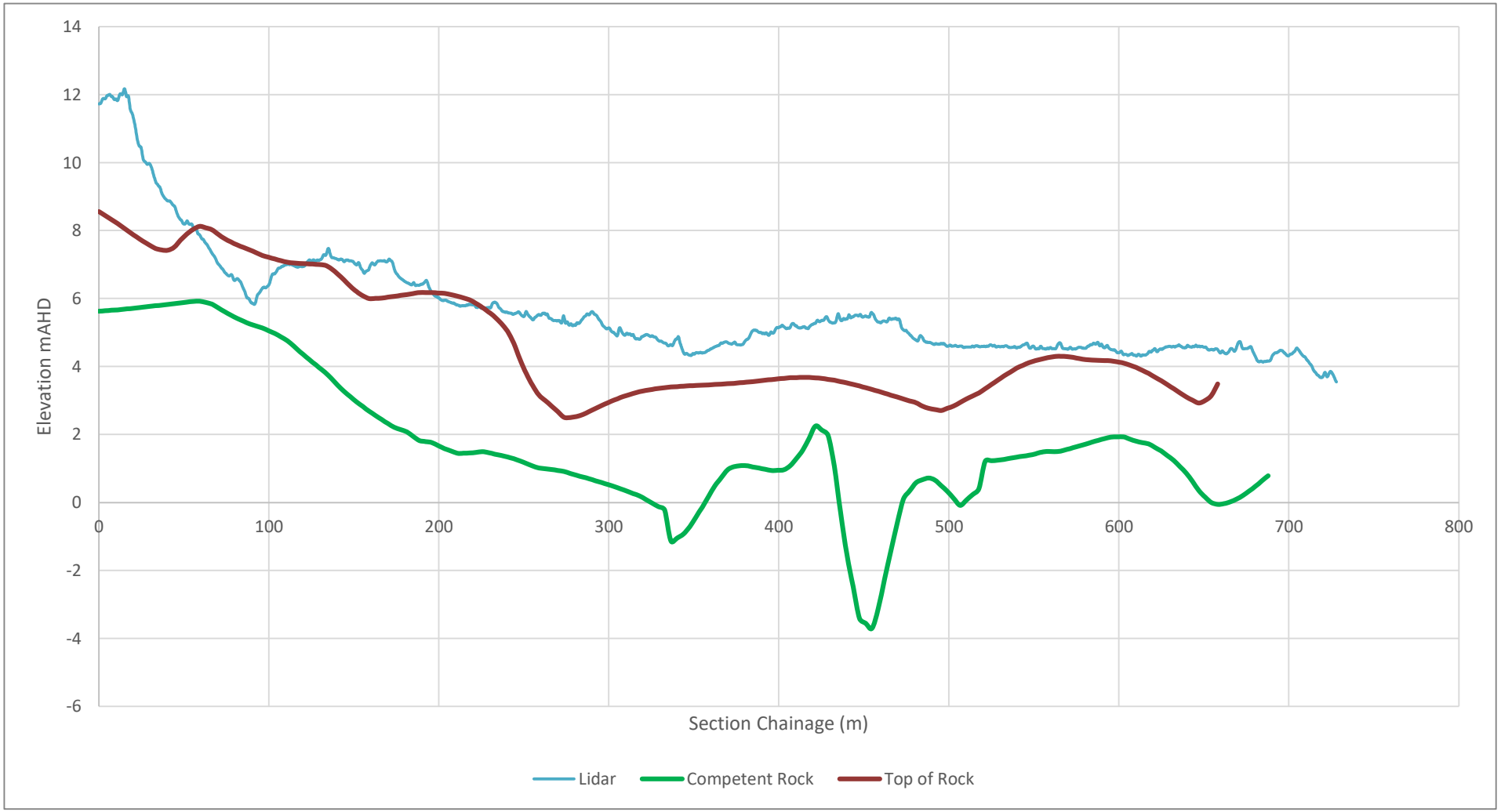

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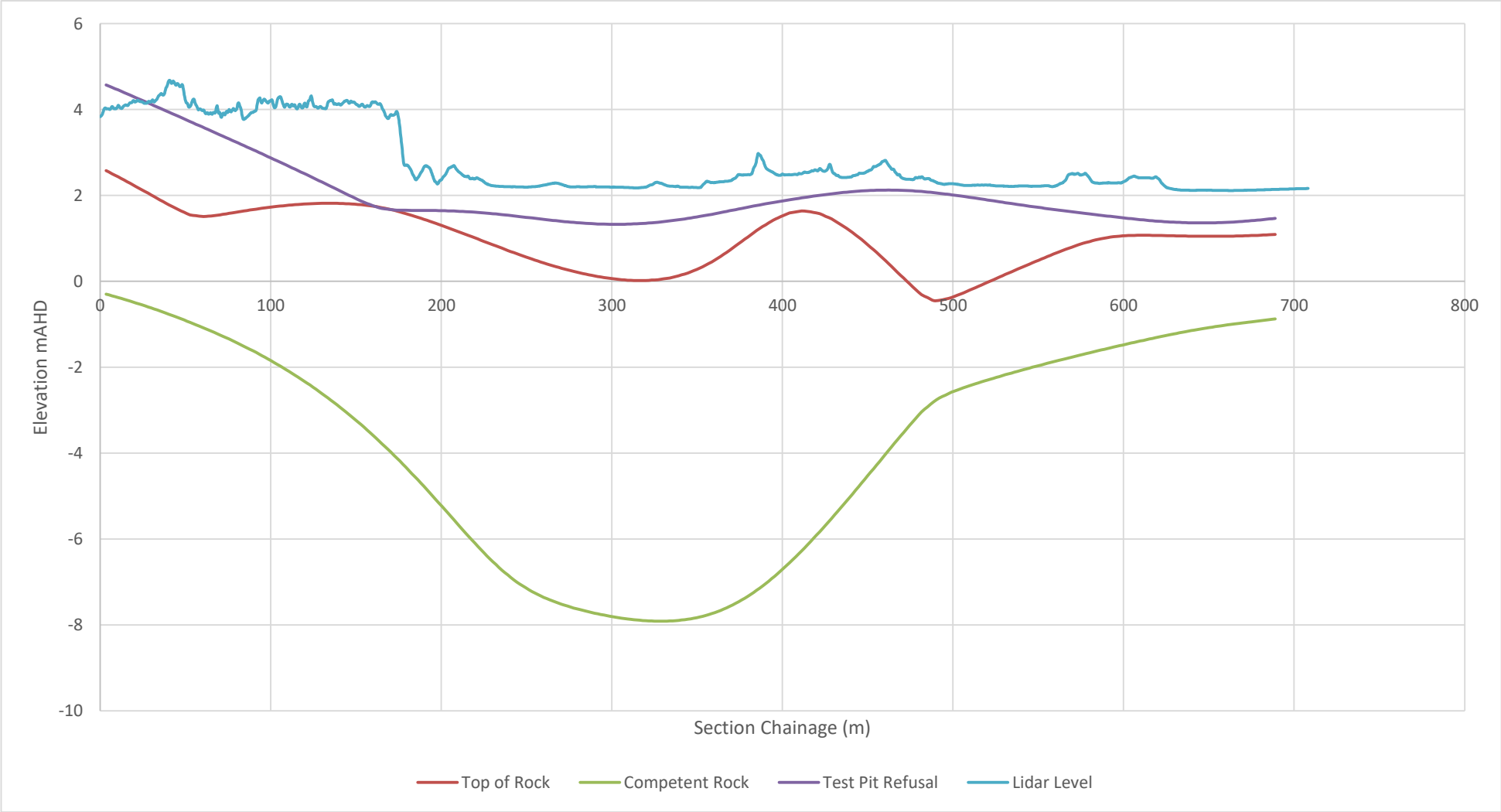

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approved			project:	Perdaman Urea Geotechnical Investigation
date			title:	Cross Section C-C'
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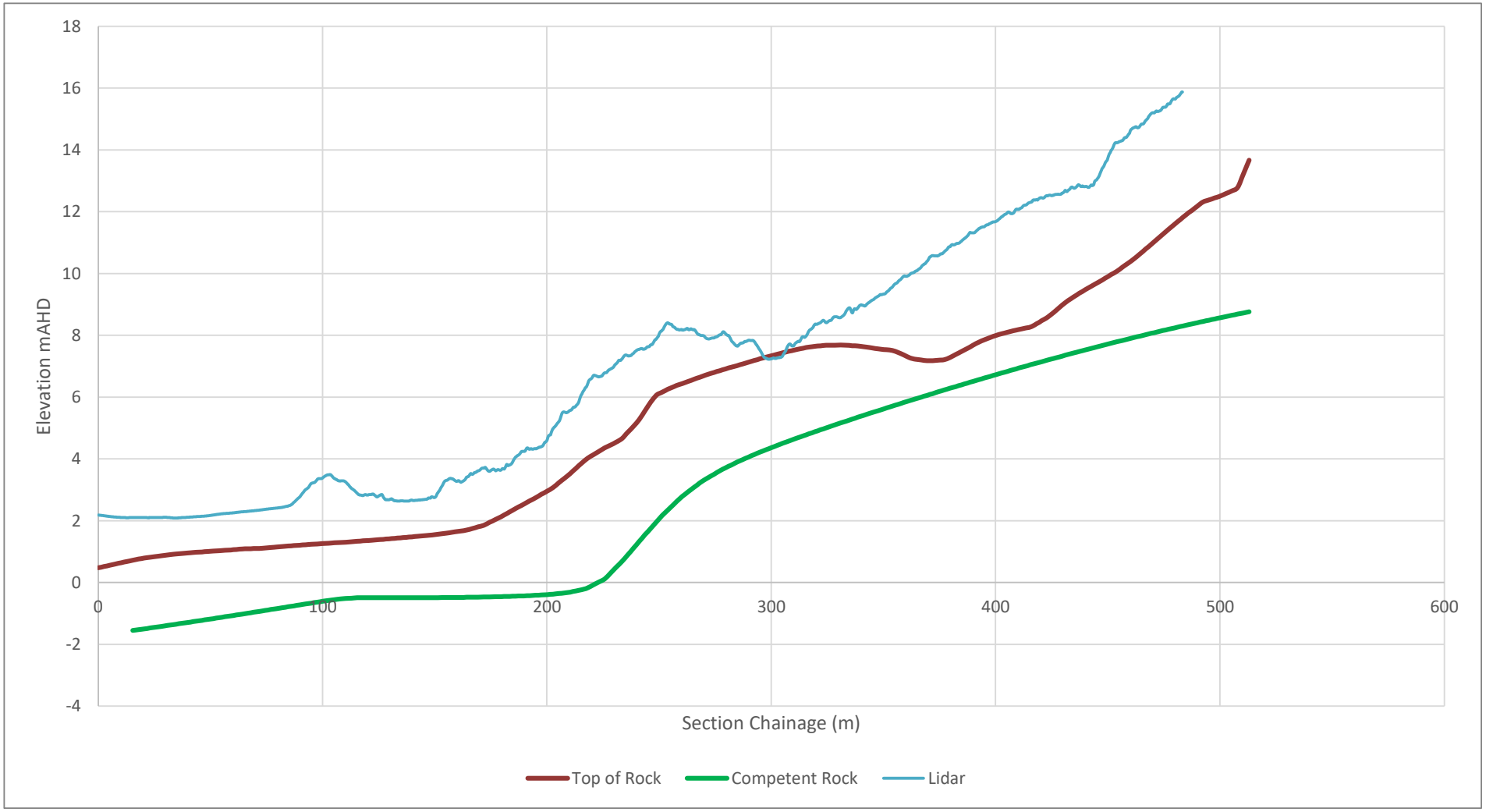

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approved			project:	Perdaman Urea Geotechnical Investigation
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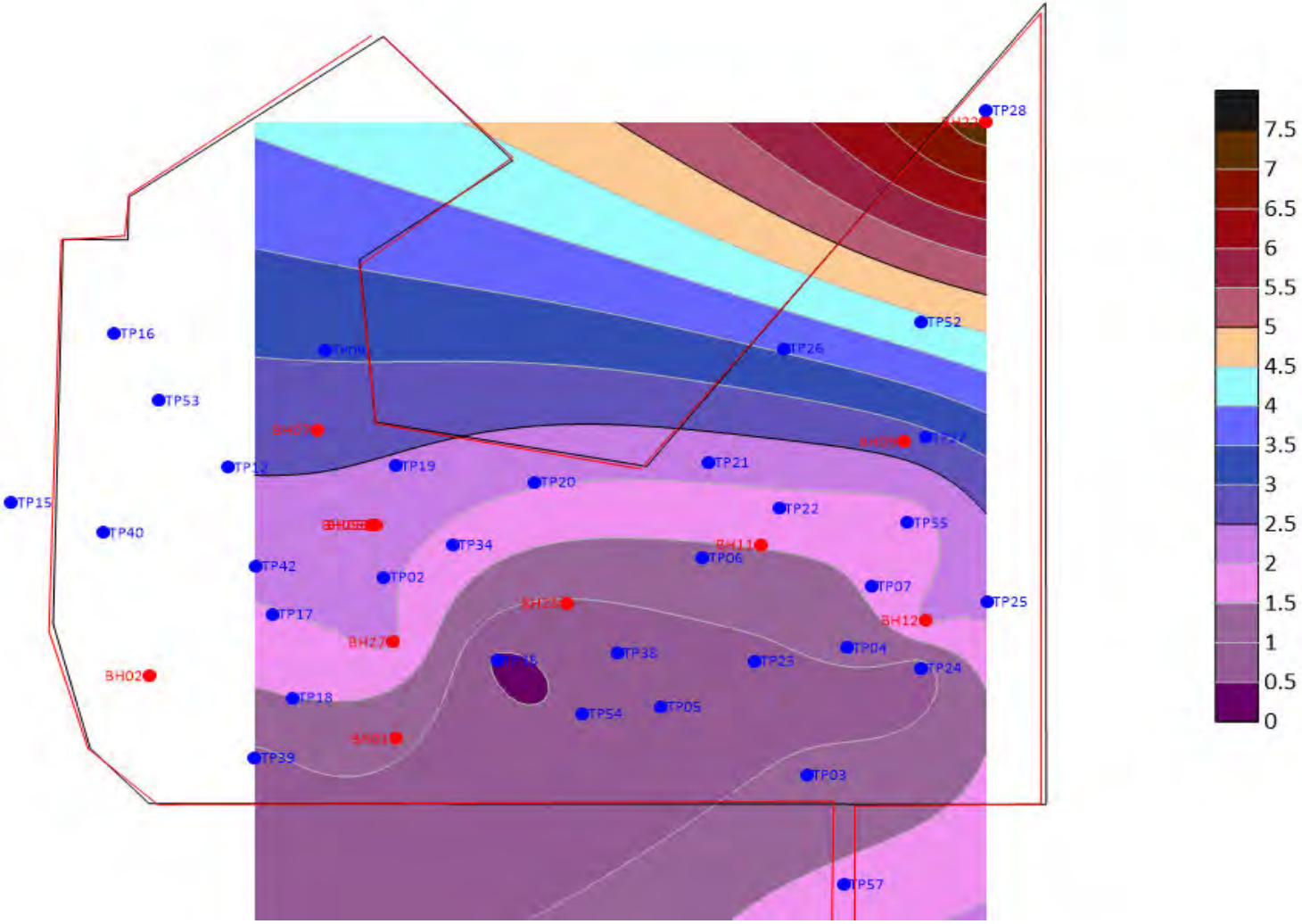

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approved			project:	Perdaman Urea Geotechnical Investigation
date			title:	Groundwater Contours
original size	**A4**		job no:	754-PERGE271567
Figure	A-17			

Appendix B
Site Photographs

APPENDIX B – CONTENTS

Photographs of Site C **26 Pages**

Photographs of Site F **8 Pages**

C1

Saddle in hill, likely dolerite dyke

C2

Boulders on surface

C3

Boundary between tidal flat and granophyre boulder terrain

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C4

Exit of creek into tidal flats

C5

Nodular calcrete

C6

Northern tidal flat with calcrete and cobbled surface

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C7

Calcrete surface

C8

Edge of tidal flat

C9

Cobbles and boulders over tidal flat terrain

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C10

Flanks of granophyre hill

C11

Looking North towards granophyre boulder topped hill

C12

Granophyre outcrop

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C13

Upper section of granophyre flanks

C14

Exit of small creek

C15

Western portion of site

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C16

Creek in west of Site C - (E 476176 N 7719011)

C17

Granophyre Outcrop near BH07 location

C18

Crest of Hill, proposed tank area

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C19

Closely spaced subvertical jointing

C20

Outcrop at tank site

C21

Closely spaced loose joints

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C22

Sand bank at north end of causeway

C23

Proposed causeway alignment

C24

Proposed causeway alignment

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C25

Drainage channel through causeway area

C26

South end of causeway

C27

Calcrete cliffs south west of causeway

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C28

Calcrete, south end of causeway

C29

West end of tidal flats

C30

Cobbles / boulders on surface of tidal flats

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C31

Tidal flat edge, sandy bank, west end of Site C

C32

Looking North-East across tidal flats

C33

Gravel scatter over north edge of tidal flat

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C34

Edge of small area

C35

Low flanks of granophyre terrain, west end, looking towards edge of Site C

C36

Tidal flats

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C37

Cobble scatter

C38

Outcropping near seawater line

C39

Marker indicating line of optic fibre

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date				
original size	A4		title:	SITE PHOTOGRAPHS
			job no:	754-PERGE271567

C40

Northern tidal flat, sand and calcrete

C41

Northern tidal flat, sand and calcrete

C42

Granophyre outcrop

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C43

Granophyre cobbles in calcrete matrix

C44

Outcropping south of BH11

C45

Close up of outcro[

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C46

Edge of sand bank on tidal flat

C47

Looking north from seawater line

C48

East end of tidal flat

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C49

Sand bank near TP25

C50

Disturbed ground at right angle turn of seawater and power lines

C51

North east corner of Site C

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C52

Looking north west towards boulder hills from near TP52

C53

Calcrete conglomerate

C54

Boulder ridge at flank break of slope

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date				
original size	A4		title:	SITE PHOTOGRAPHS
			job no:	754-PERGE271567

C55

Flanks of granophyre hills

C56

Granophyre outcrops with subvertical jointing

C57

Granophyre outcrops with subvertical jointing

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C58

Mid slope, south of access track

C59

Boulders near BH09

C60

Mid slope, south of access track

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date				
original size	A4		title:	SITE PHOTOGRAPHS
			job no:	754-PERGE271567

C61

Low flanks looking south

C62

Steeper than typical slope towards tidal flat

C63

Looking north towards hills which are to the north of Site C

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C64

Looking south along pipeline alignment

C65

Looking north towards BH06 during drilling

C66

Creek crossing on pipeline

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date				
original size	A4		title:	SITE PHOTOGRAPHS
			job no:	754-PERGE271567

C67

Looking east across site

C68

Outcropping at north-centre

C69

Calcrete edge of tidal flat

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C70

TP55 Area

C71

TP55 Pit Face

C72

TP55 Spoil

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C74

Creek crossing on pipeline

C75

Flanks near TP19

C76

Cobbles and boulders at minor creek exit

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

C77

Flanks near TP20

C78

Outcropping east of TP20

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date				
original size	A4		title:	SITE PHOTOGRAPHS
			job no:	754-PERGE271567

F01

Track on former Hearson Cove Road alignment

F02

Rehabilitated area, north west of Site F

F03

Rehabilitated area, north west of Site F

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

F04

Slighlty lower lying area, central part of northern Site F boundary

F05

Boulders, east end of former Hearson Cove Road track

F06

Calcrete gravel, east end of former Hearson Cove Road track

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

F07

Heavier vegetation, north west of Site F

F08

Outcropping, southern flanks

F09

Outcropping, southern flanks

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date				
original size	A4		title:	SITE PHOTOGRAPHS
			job no:	754-PERGE271567

F10

Testpit for unknown investigation, indicating gravel

F11

Pushed up gravel, south of TP46

F12

Standpipe or geophysical casing, dry

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

F13

Eastern edge of Site F

F14

Exposed internal boulder

F15

Mixed gravel surface

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

F16

Minor dip in centre of Site F

F17

Looking toward southern hills

F18

Boulder ridge

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date				
original size	A4		title:	SITE PHOTOGRAPHS
			job no:	754-PERGE271567

F19

Pavement of temporary road

F20

South east of TP49

F21

Southern end of link between Site C and F (south of causeway)

drawn		coffey A TETRA TECH COMPANY	client: CLOUGH
approved			project: PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			
original size	A4		title: SITE PHOTOGRAPHS
			job no: 754-PERGE271567

F22

Existing track

F23

Remnants of former road

F24

drawn		coffey A TETRA TECH COMPANY	client:	CLOUGH
approved			project:	PERDAMAN UREA GEOTECHNICAL INVESTIGATION
date			title:	SITE PHOTOGRAPHS
original size	A4		job no:	754-PERGE271567

Appendix C
Geophysical Testing Results

APPENDIX C – CONTENTS

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Electrical Resistivity Test Results	**16 Pages**
Thermal Resistivity Test Results	**1 Pages**
Calibration Certificates	**6 Pages**

DRAIG GEOSCIENCE PTY LTD

GEOPHYSICAL INVESTIGATION – SEISMIC REFRACTION, DOWNHOLE SEISMIC, SOIL RESISTIVITY, THERMAL RESISTIVITY

PERDAMAN UREA PROJECT & DAMPIER PORT, DAMPIER, WA

COFFEY GEOTECHNICS PTY LTD

DG1622COF

DRAIG GEOSCIENCE PTY LTD

Version 3.0

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Disclaimer

The interpretations contained in this report are based on the training and experience of the author and information passed on during the course of the investigation. As with all geophysical data, multiple interpretations are possible. The Client is advised to consider information from all available sources prior to making a decision on how to proceed.

Lee Tasker	**Dr Kathleen McMahon**
Director / Geophysics Consultant	Geophysics Consultant

DRAIG GEOSCIENCE PTY LTD

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DRAIG GEOSCIENCE PTY LTD

Executive Summary

Draig Geoscience (Draig) was approached by Coffey Geotechnics Pty Ltd (Coffey) to perform a geophysical investigation at locations within the Burrup Strategic Industrial Area near Dampier, WA. These investigation locations included within Site C and Site F of the Perdaman Urea Project site and within the Pilbara Port Authority Dampier Port site near Dampier, WA.

The objective of the geophysical investigation was to assist Coffey with providing soil property information. Seismic refraction, crosshole seismic testing, electrical resistivity testing and thermal resistivity testing were requested by Coffey. The fieldwork commenced on Wednesday, August 19th 2020 and was completed Thursday, August 27th 2020. Data were acquired at 15 electrical resistivity testing locations and 12 thermal resistivity testing locations. A total of 744 line metres of seismic refraction data were acquired. Due to borehole water leakage on the second drilled hole, downhole seismic testing was performed instead of the originally planned crosshole seismic testing, with data acquired down to 11 m depth from surface.

P-wave velocity (V_p) across the Site C refraction lines ranged from ~355-5800 m/s, modelled to a minimum depth extent of ~12 m depth (dependant on site conditions and raypath coverage). V_p velocity distribution along the refraction lines was generally undulating in V_p values, and V_p was more variable along the profile lines SR01A and SR03 than SR01B and SR02.

In general, V_p in the top 2 m reached up to ~1000-1400 m/s across the investigation area. SR01A displayed the highest V_p in the near-surface (top 2 m), with V_p up to 2200 m/s and >3000 m/s occurring in the top 2 m in two separate parts along the line. SR01A also displayed the lowest V_p at depth, with V_p<3000 m/s at depths up to ~15 m depth towards the western end of the line. Higher V_p such as 4000 m/s contour varied in depth across the investigation area, from ~0.5 m RL to ~-10 m RL, and between ~5-17 m depth from surface. SR03 displayed an isolated area of V_p>4000 m/s near the centre of the line at an approximate centre depth of ~8 m depth.

Downhole VSP data showed a V_p range of 756-1878 m/s and a V_s range of 291-519 m/s between 1-11 m depth at the borehole location.

An average site value of 94.81 Ωm was calculated for apparent soil resistivity. An average site value of 1.31 mK/W or 1.31 m-°C/W was calculated for thermal resistivity and 18.9% VWC for soil moisture (for measurements between 0 m depth and 0.8 m depth).

The geophysical investigation at the sites at the Perdaman Urea Project and at Dampier Port near Dampier, WA, was successful in characterising the sub-surface soil properties in the survey areas of interest in terms of P-wave velocity along profiles, 1D P-wave and S-wave velocity at the borehole location, and soil electrical resistivity and thermal resistivity properties.

1. Introduction

1.1 Project Background and Objectives

Coffey Geotechnics Pty Ltd (Coffey) communicated to Draig Geoscience Pty Ltd (Draig) that Coffey required a geophysical investigation at sites located within the Burrup Strategic Industrial Area approximately 10 km from Dampier and 20 km north-west of Karratha, WA (email comm. Tristan Chua, Coffey, 12/05/2020). The investigations locations included the Perdaman Urea Project site (Site C and Site F) and Pilbara Port Authority (PPA) Dampier Port (see Figure 1 for a regional location map of these investigation areas).

The following objectives of the proposed geophysical investigation were outlined:

- Seismic refraction testing to assist with characterising the P-wave properties of the ground materials for excavation purposes
- Crosshole seismic testing between two 12 m deep boreholes
- Electrical resistivity tests
- In-situ thermal resistivity tests

The investigation is based on seismic refraction and crosshole seismic test being undertaken at Site C, and thermal resistivity and soil electrical resistivity testing being undertaken at Site C, Site F and at PPA Dampier Port.

Note: During the field program, Coffey advised Draig that the second borehole required to perform crosshole seismic testing was unsuccessful and only one borehole was available. Draig proposed downhole seismic testing as an alternative, which was approved and downhole seismic data was acquired. This report will refer to downhole seismic testing and present these results.

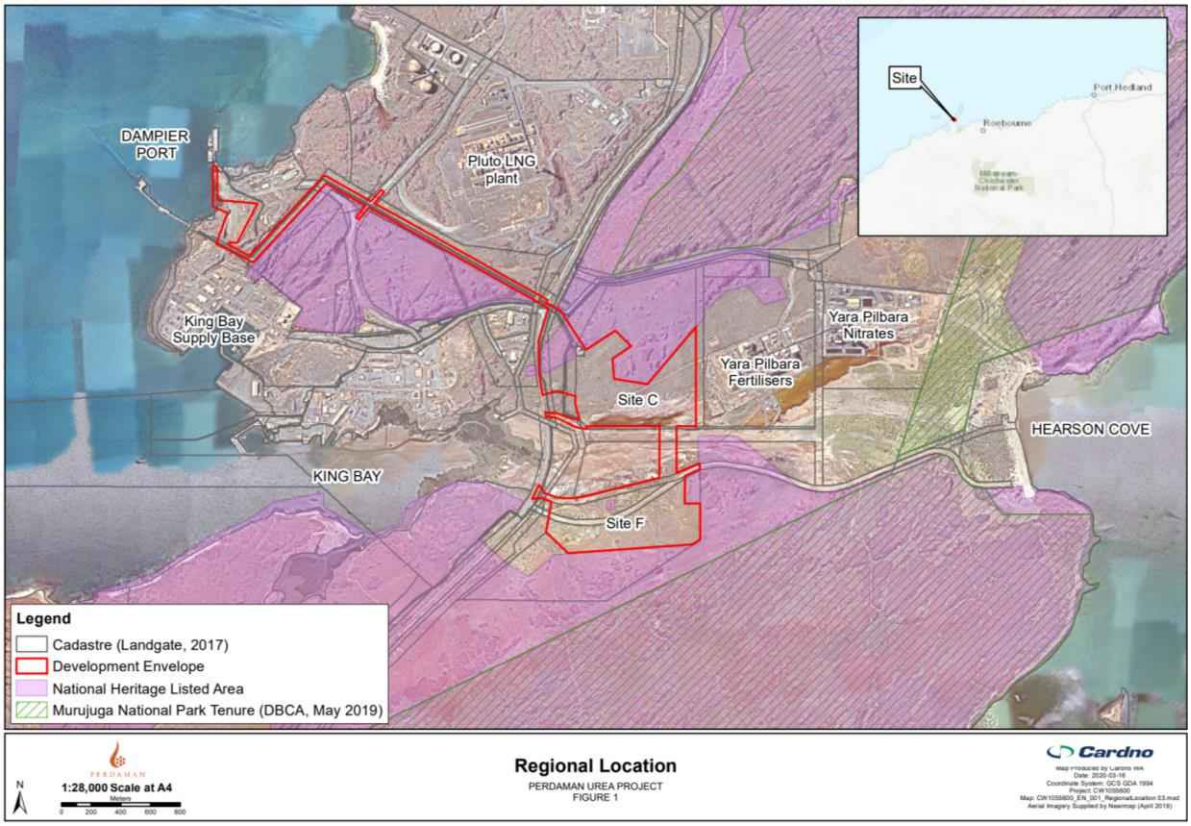


Figure 1. Regional location map of Perdaman Urea Project (Site C and Site F) and Dampier Port investigation areas, WA. (Image source: https://www.epa.wa.gov.au/sites/default/files/PER_documentation2/Figure%201_RegionalLocation.pdf, accessed 10/09/2020)

1.2 Geophysical Investigation Strategy

For the seismic investigation, Draig proposed to use a PASI GEA24 seismograph, and a PASI GFA-50-3-component downhole geophone setup for the downhole seismic testing. Draig proposed an arbitrary 3 x 300 m seismic refraction profiles across an investigation area of approximately 700 x 300 m (dimensions provided by Sean Eyre, Coffey, 13/05/2020). It was assumed that the depth of interest for the seismic refraction was 10 m depth (email comm., Tristan Chua, Coffey, 13/05/2020). Draig selected to utilise a 3 m geophone spacing, 69 m spread length, to achieve a depth of interest down to ~15 m depth from surface (ground conditions permitting). Downhole geophone spacing was proposed to be 1 m, to the maximum depth achievable within the 12 m length borehole.

Soil electrical resistivity testing was requested for 0.5 m, 1 m, 3 m and 6 m a-spacing with orthogonal N-S and E-W readings at each location. Draig would perform this test with a

4-electrode Wenner test with Sonel MRU120HD equipment. In-situ thermal resistivity tests were proposed to be carried out with a M.A.E. TCR24 thermal resistivity probe.

A description of the data acquisition carried out on-site are described in Section 2 – Field Acquisition.

1.3 Technique Limitations

Seismic Refraction

- Seismic refraction is affected by external seismic noise and is recommended to be utilised in areas of low seismic noise e.g. away from active drill rigs and operating vehicles/machinery.
- Seismic refraction relies on a contrast in the elastic modulus of the geology i.e. stiffer materials generally provide a higher P-wave velocity (V_p) than less-stiff materials which provide a lower V_p.
- If there is no V_p contrast in the geology, features and sharp boundaries will be not be imaged.

Downhole Testing

- Seismic methods are sensitive to vibrational noise (e.g. heavy machinery vibrating, traffic etc.). Therefore, seismic data should be recorded at locations with low ground vibrational noise.
- Seismic methods rely on a density contrast between geomaterials. If there is no density contrast, seismic boundaries may not be imaged.

Soil Resistivity Testing

- Soil resistivity tests are sensitive to soil moisture and cultural electromagnetic (EM) noise. Tests should preferably be carried out at locations in the absence buried metal services or highly electrically conductive geomaterial e.g. shallow saline groundwater, shallow clays etc.

Thermal Resistivity Testing

- Thermal resistivity tests are highly sensitive to soil moisture. It is advisable to take a soil moisture measurement at each test location to determine if the correct needle input voltage is being utilised for the ground conditions experienced at each location.

2. Field Acquisition

2.1. Fieldwork Details

Acquisition Dates:

- 17/08/2020-18/08/2020 – Mobilisation to site.
- 19/08/2020 – Acquisition of thermal resistivity data (WTT7, WTT9 at Site C), soil resistivity data (WT1, WTT7, WTT9 at Site C).
- 20/08/2020 – Acquisition of thermal resistivity and soil resistivity data (WTT2, WTTW3, WTT4, WTT5 at Site C).
- 21/08/2020 – Acquisition of thermal resistivity data (TT1, WTT1 at Site F, WTT6 at Site C), soil resistivity data (WT4, WTT6 at Site C, WTT1 at Site F).
- 22/08/2020 – Acquisition of thermal resistivity data (WTT8 at Site C), soil resistivity data (WT2, WT3, WTT8 at Site C).
- 23/08/2020 – Acquisition of seismic refraction data (SR03 at Site C).
- 24/08/2020 – Acquisition of seismic refraction data (SR02 at Site C).
- 25/08/2020 – Acquisition of seismic refraction data (SR01A at Site C).
- 26/08/2020 – Acquisition of seismic refraction data (commenced SR01B at Site C), thermal resistivity and soil resistivity testing (WTT10, WTT11 at PPA Dampier Port).
- 27/08/2020 – Acquisition of seismic refraction data (completion of SR01B at Site C), downhole seismic testing (borehole location within Site C).
- 28/08/2020-29/08/2020 – Demobilisation from site.

Acquisition was carried out on foot. Vehicle access to sites was via designated access ways due to nearby areas of cultural significance.

SR01 was intended to be acquired as a single line, however the planned seismic refraction line crossed a road which could not be closed to traffic. SR01 was split into two separate lines on either side of the road – SR01A (east of road) and SR01B (west of road).

On 22/08/2020, Draig were informed by Christian Soetjipto (pers. comm.) that the second borehole for the crosshole seismic test had a leak and was full of water. Draig recommended acquiring downhole seismic data instead, which would only require the use of the single successful borehole. The PASI GFA-50-3-component downhole geophone could still be utilised, with a seismic source at the surface. This alteration of technique was approved (Christian Soetjipto, 22/08/2020, pers. comm.).

2.2. Site Conditions

The Perdaman Urea Project site varied in surface conditions from rock outcrops, to loose rock and scrubby vegetation, to soil and grasses, to tidal flat conditions with saline soil. Figure 2 shows photographs of these site conditions.

The PPA Dampier Port site was a quarry, with rock at the surface. No photographs were permitted for security reasons.

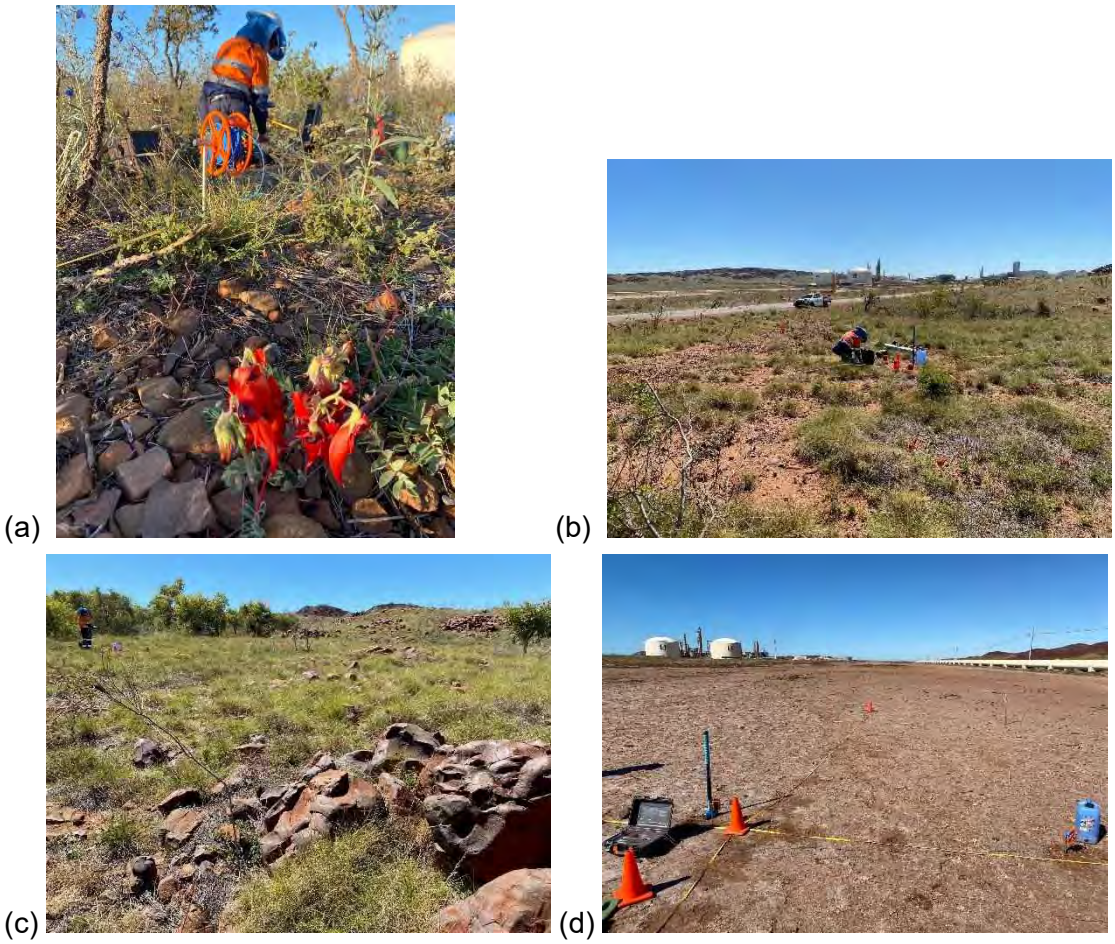


Figure 2. Images of the general site surface conditions at Perdaman Urea Project locations. (a) Scrub vegetation and loose rock, (b) dirt and grasses, (c) rock outcrops, (d) tidal flat area. (Image source: Draig)

2.2. GPS Data

GPR profile start and end positions were recorded with a GPS survey using a Juniper Systems Geode DGPS unit, acquired through EffiGIS EZTag software and post-processed using EffiGIS EZSurv software. WTT10 and the borehole GPS locations were recorded with a handheld Garmin 64S GPS.

2.3. Seismic Refraction Data

A PASI GEA24 seismograph was used for seismic refraction data recording, powered through the field laptop. Seismic geophones of 14 Hz frequency were connected to a 24-channel seismic cable at 3 m geophone spacing. Seismic geophones were coupled to the ground via

a 7.5 cm metal spike connected to the geophone and each geophone was connected to a channel on the seismic cable. For longer profile lines, overlapping spreads were utilised. A record length of 0.3 seconds and a sample interval of 0.125 milliseconds were used for data recording parameters.

The seismic refraction investigation consisted of four profiles lines over the three proposed lines – SR01A, SR01B, SR02 and SR03. The proposed line SR01 was split into two lines, SR01A and SR01B, due to a road intersecting the proposed seismic refraction line which could not be closed to road traffic to allow for data acquisition.

A site plan of the seismic refraction profile locations is shown in Appendix A Figure A1 and images of SR01A and SR01B refraction lines split by the road are shown in Figure 3.

(a) (b)

Figure 3. Images showing seismic lines set-up on either side of the road for line SR01. (a) End of line SR01A near road, facing west, and (b) end of line SR01B near road, facing east. (Image source: Draig)

General seismic refraction profile coordinates are shown in Table 1.

Table 1. General seismic refraction profile line coordinates and details for the investigation (Datum – GDA94, MGA Z50).

Line ID	Site Area	Line Start		Line End		No. of Spreads	Approx. Profile Length (m)
		Easting (mE)	Northing (mN)	Easting (mE)	Northing (mN)		
SR01A	Site C	476665.6	7718999.5	476542.3	7718999.0	2	123
SR01B	Site C	476537.8	7719000.1	476245.5	7718998.0	5	294
SR02	Site C	476423.5	7718930.0	476231.1	7718918.1	3	195
SR03	Site C	476297.9	7718873.1	476300.0	7719004.0	2	132

2.4. Downhole Seismic Data

Downhole seismic data was acquired with a PASI GEA24 seismograph and a PASI GFA-50-3-component downhole geophone set-up. The Z-channel of the geophone was vertically oriented (along the long-axis of the geophone tool). The X-axis (H1) and Y-axis (H2) were horizontally oriented, perpendicular to the Z-axis and also perpendicular to one another horizontally.

For downhole seismic data acquisition, a trace record length of 0.2 seconds and a sample interval of 0.125 milliseconds were used for seismic data acquisition parameters. Seismic data was recorded at 1 m intervals from the bottom of the accessible hole (11 m depth) to the surface (1 m depth). Depths down the borehole were referenced by noting the depth from 1 m markers on the downhole geophone cable in relation to the top of the borehole PVC collar at the surface.

For the generation of the seismic energy wave, a 10 lb sledgehammer striking a metal plate was used to create a P-wave, and a 10 lb sledgehammer striking the end of a 3 m length log of wood secured under the front wheels of a vehicle was used to create an S-wave. S-wave shots were performed at each end of the wooden log. The P-wave shot location was 1.25 m west of the borehole collar. The centre of the wooden log was located 1.25 m east of the borehole collar and oriented N-S. S-wave shot locations were at the ends of the wooden log – 1.5 m north and 1.5 m south of the centre of the log.

Figure 4 shows the general downhole seismic testing set-up utilised for this investigation.

(a)

(b)

(c)

Figure 4. Image of the downhole seismic test set-up. (a) Seismic recording equipment, (b) P-wave data acquisition with sledgehammer on metal plate source, (c) S-wave data acquisition with sledgehammer and wooden log source. (Image source: Draig)

A site plan of the borehole location is shown in Appendix A Figure A1.

A GPS coordinate for the borehole location is shown in Table 2. This GPS point was acquired with a handheld Garmin 64S unit.

Table 2. Downhole test coordinate at borehole, Site C (Datum – GDA94, MGA Z50).

Test ID	Site Area	Centre-Point	
		Easting (mE)	Northing (mN)
Borehole	Site C	476343	7718972

2.5. Soil Resistivity Tests

Soil resistivity data acquisition was carried out using the 4-electrode Wenner method, with two Draig personnel on-site. A Sonel MRU120HD soil resistivity meter (Serial/Certificate Number: 209210/20, Certificate Issue Date: January 8th 2020) was used to record the soil resistivity data with measurements taken at 0.5 m, 1 m, 3 m and 6 m a-spacings.

A saline water solution was used to water the electrode locations at some locations due to the high surface contact resistance measured at electrodes. Other electrode locations did not require watering, and some electrode locations were naturally electrically conductive due to saline ground conditions.

Figure 5 shows the general soil resistivity testing set-up utilised for this investigation.

Figure 5. Image of the soil resistivity test set-up at a Perdaman site location. (Image source: Draig)

General soil resistivity test coordinates are shown in Table 3.

Table 3. General investigation site soil resistivity test coordinates (Datum – GDA94, MGA Z50). (Note. WTT10 location was recorded with a handheld GPS.)

Test ID	Site Area	Centre-Point	
		Easting (mE)	Northing (mN)
WT1	Site C	476361.6	7718848.8
WT2	Site C	476160.3	7719066.4
WT3	Site C	475931.1	7719318.5
WT4	Site C	475986.9	7719416.2
WTT1	Site F	476691.0	7718314.7
WTT2	Site C	476784.2	7718805.0
WTT3	Site C	476762.9	7718981.1
WTT4	Site C	476767.0	7719149.5
WTT5	Site C	476644.1	7718792.2
WTT6	Site C	476612.3	7718957.7
WTT7	Site C	476374.3	7718764.6
WTT8	Site C	476324.7	7718950.5
WTT9	Site C	476189.712	7718787.1
WTT10	PPA Dampier Port	473928	7720030
WTT11	PPA Dampier Port	473944.1	7720174.7

Site plans of the soil electrical resistivity test locations is shown in Appendix A Figure A1-A3.

2.6. Thermal Resistivity Tests

Thermal resistivity data acquisition was carried out using an M.A.E. TCR24 thermal resistivity probe to record the thermal resistivity data (Serial/Certificate Number: M20CTP0011, Certificate Issue Date: June 15th 2020). Measurements were acquired at various depths, including 0 m, 0.2 m, 0.4 m, 0.6 m, and 0.8 m depth, which were determined at each location based on site conditions (e.g. depth before hitting rock). The thermal needle utilised for data acquisition was a Hukseflux TP09 (Serial/Certificate Number: 558, Certificate Issue Date: March 24th 2020). **Note.** The thermal needle was also tested by the equipment supplier against a glycerine/glycerol filled reference cylinder, a Hukseflux CR05, to ensure the thermal needles are within value range/specification (Serial/Certificate Number: 8032, Certificate Issue Date: June 2nd 2008).

Soil moisture measurement were also taken at each thermal resistivity test location at the same depth as thermal resistivity measurements, using an ICT International MPKit moisture probe.

Figure 6 shows the general thermal resistivity and soil moisture testing set-up utilised for this investigation.

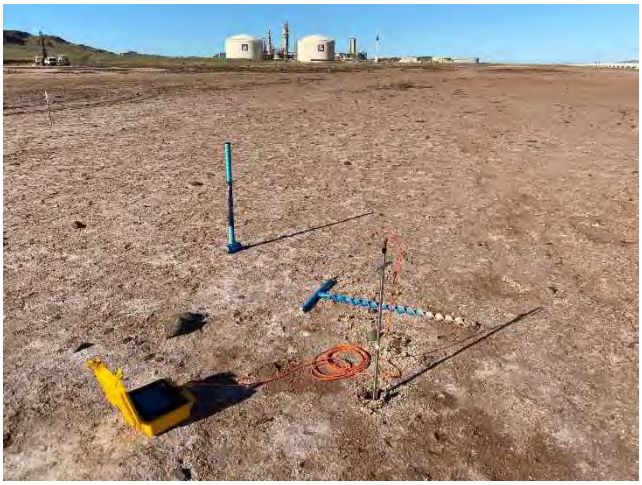
(a)  (b)

Figure 6 (a). Image of the thermal resistivity test set-up at a Perdaman site location and (b) the soil moisture testing set-up at a Perdaman site location. (Image source: Draig)

General thermal resistivity test coordinates are shown in Table 4.

Table 4. General investigation site thermal resistivity test coordinates (Datum – GDA94, MGA Z50).

Test ID	Site Area	Centre-Point	
		Easting (mE)	Northing (mN)
TT1	Site F	476663.0	7718030.5
WTT1	Site F	476693.8	7718314.4
WTT2	Site C	476785.2	7718806.9
WTT3	Site C	476763.5	7718979.9
WTT4	Site C	476767.0	7719148.4
WTT5	Site C	476644.1	7718792.2
WTT6	Site C	476612.3	7718957.7
WTT7	Site C	476374.3	7718764.6
WTT8	Site C	476324.7	7718950.5
WTT9	Site C	476189.7	7718787.1
WTT10	PPA Dampier Port	473929.2	7720025.9
WTT11	PPA Dampier Port	473932.0	7720153.6

Site plans of the thermal resistivity test locations are shown in Appendix A Figure A1-A3.

3. Results and Interpretation

3.1. Data Processing Steps

Seismic Refraction

Data QC and the first-arrival picks were made using Geometrics SeisImager software. These picks were imported into Rayfract software, which was used to run tomographic inversions on the data. In this investigation 20 iterations were chosen for the inversion process. The Normalized RMS Error, Raypath output and Tomography cross-section were QC'd after inversion. The models for each seismic line resulted in a Normalized RMS error of <4%, which passed QC. The inverted P-wave velocity (V_p) data models were gridded, displayed and contoured in QGIS software, and V_p values associated with a low rays/point value (e.g. a low raypath coverage value) were blanked/whited out.

Downhole Testing

Downhole seismic data processing was carried out using Geometrics SeisImager for first arrival picking, and VSP values were calculated from those picked times.

3.2. Data Interpretation

Seismic Refraction

Seismic refraction sections displaying contoured gridded V_p results are displayed in Appendix B, Figures B1-B4.

SR01A displays a V_p value range ~525-5200 m/s, and along-line variation is observed in V_p values. High V_p velocities are observed in the near-surface at the western end of the line, to ~476552 mE. This end of the line was at the roadside. V_p is <1000 m/s in the top 2 m for most of the remainder of the line, the exception being between ~476562-476586 mE where V_p is between approximately 1000-2200 m/s in the top 2 m. V_p reaches 4000 m/s at ~-2.5 m RL (~7.5 m depth) between ~476580-476598 mE and between ~476628 mE to the eastern end of the line. Between these sections of the line, and west of ~476580 mE, lower V_p velocities <3200 m/s are observed to the base of the model.

SR01B displays a V_p value range ~405-5600 m/s. V_p contours are observed to undulate along the line, although V_p is more uniform along the SR01B line than along SR01A, with less along-line V_p variation at each depth. The surface 2 m display V_p <1000 m/s. V_p reaches 4000 m/s at varying RL/depths along the line, with the shallowest depths for this V_p at ~0.5 m RL

(~6.5 m depth) in the east of the line and ~-2 m RL (~7 m depth) in the west of the line. At its deepest, V_p 4000 m/s is observed down to ~-7 m RL (~12 m depth).

SR02 displays a V_p value range ~355-5800 m/s. SR02 is similar to SR01B in that V_p contours are observed to undulate along the line, and V_p displays less along-line V_p variation at each depth than SR01A. The surface 2 m display slightly higher V_p than SR01B, with V_p <~1200 m/s in the east and <~1400 m/s in the western part of the line. V_p reaches 4000 m/s at varying RL/depths along the line, with the shallowest depth for this V_p at ~-0.5 m RL (~5 m depth) at ~476308 mE. Elsewhere V_p 4000 m/s generally varies between ~-5 m RL and ~-10 m RL (~10-14 m depth), and is observed at its deepest at ~-13 m RL (~17 m depth) near the western end of the line.

SR03 displays a V_p value range ~400-5800 m/s. SR03 displays along-line variation in V_p. Similar to near-surface V_p along SR02, the surface 2 m display V_p <~1200 m/s in the south and <~1500 m/s in the northern half of the line. From ~2-7 m depth, V_p in the northern half of the line are higher than V_p in the southern half of the line (up to ~3600 m/s as opposed to ~2000 m/s, respectively). An isolated area of V_p>4000 m/s is observed between ~7718949-7718955 mN, ~-1 m RL to ~-2.5 m RL (~7-8.5 m depth). Below this V_p values decrease to ~3400 m/s. North of this isolated higher V_p area, V_p 4000 m/s occurs at ~-1.5 m RL to ~-4 m RL (~7.5-10 m depth). South of this isolated higher V_p area, V_p 4000 m/s occurs at ~-5m RL to ~-8 m RL (~10-13 m depth).

Downhole Test

VSP results (velocity V_p and V_s values) are given in Table 5. A plot of these velocity values against depth is displayed in Figure 7.

Table 5. VSP velocity results for downhole seismic testing at borehole location, Site C.

Depth (m)	Vp (m/s)	Vs (m/s)
1	867	291
2	756	410
3	919	441
4	1110	337
5	1651	414
6	1491	345
7	1608	396
8	1799	342
9	1878	349
10	1419	442
11	1282	519

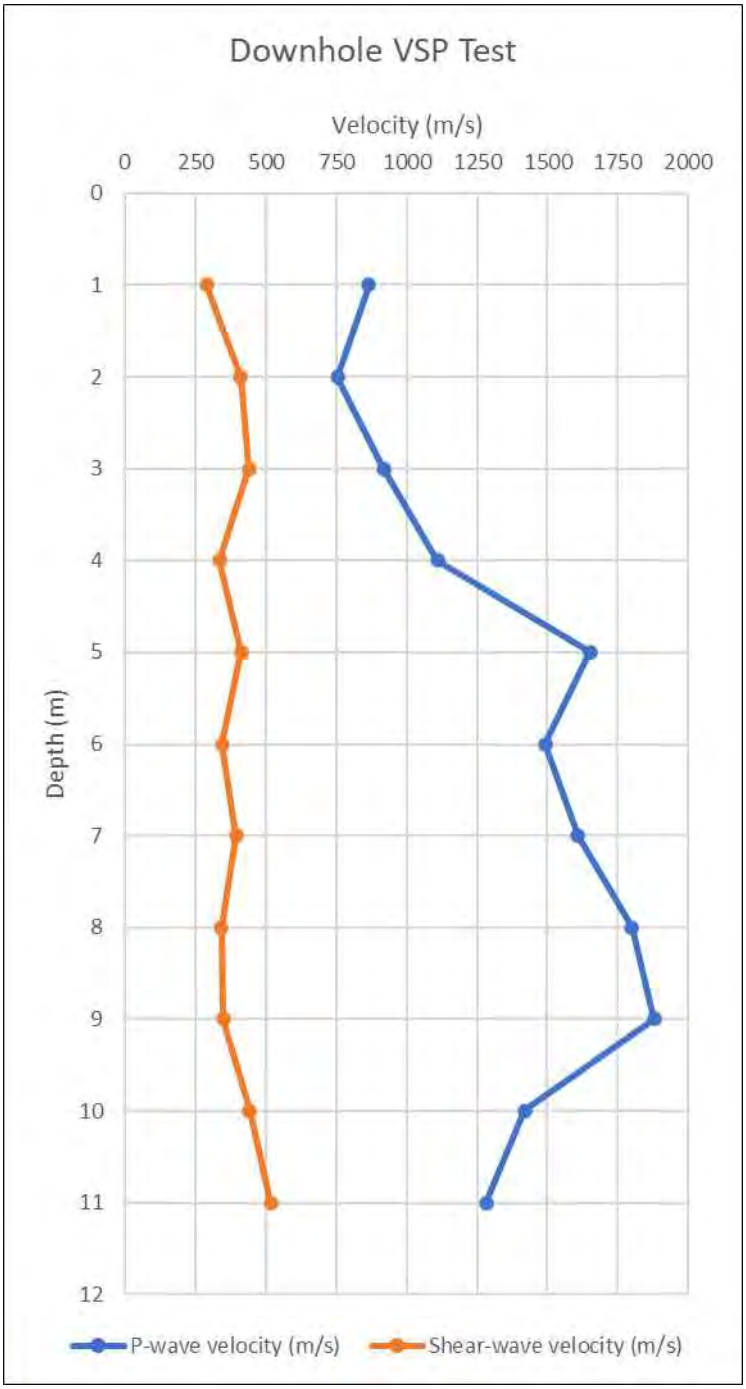


Figure 7. Plot of VSP data at borehole location, Site C.

V_p values range between 756-1878 m/s. V_p values are less than ~1100 m/s in the surface 4 m. Below this between 5-9 m depth, V_p increases to ~1500-1900 m/s. At the base of the borehole at 10-11 m depth, the V_p decreases to ~1300-1400 m/s.

V_s values range between 291-519 m/s.

Soil Resistivity Tests

The apparent soil resistivity test readings plotted against a-spacing curves are shown in Appendix C, Figures C1-C15. The summary results table for the soil resistivity test readings are shown in Appendix C, Figure C16.

The soil resistivity values ranged from 0.19-425.06 Ωm across the site, and a site average soil resistivity of 94.81 Ωm was calculated.

Thermal Resistivity Tests

The summary results table for the thermal resistivity test readings and soil moisture measurements across the investigation are shown in Appendix D, Figure D1.

The thermal resistivity values ranged from 0.12-4.08 mK/W or 0.12-4.08 m-°C/W across the site, and a site average thermal resistivity of 1.31 mK/W or 1.31 m-°C/W was calculated. The soil moisture measurements ranged from 0-46% volume water content (VWC) across the site, and a site average soil moisture of 18.9% VWC was calculated.

4. Conclusions

The geophysical investigation at the sites at Perdaman Urea Project and at Dampier Port near Dampier, WA, was successful in characterising the sub-surface in terms of P-wave velocity along profiles, 1D P-wave and S-wave velocity at the borehole location, and soil electrical resistivity and thermal resistivity properties.

V_p across the Site C refraction lines ranged from ~355-5800 m/s, modelled to a minimum depth extent of ~12 m depth (dependant on site conditions and raypath coverage). V_p velocity distribution along the refraction lines was generally undulating in V_p values, and V_p was more variable along the profile lines SR01A and SR03 than SR01B and SR02.

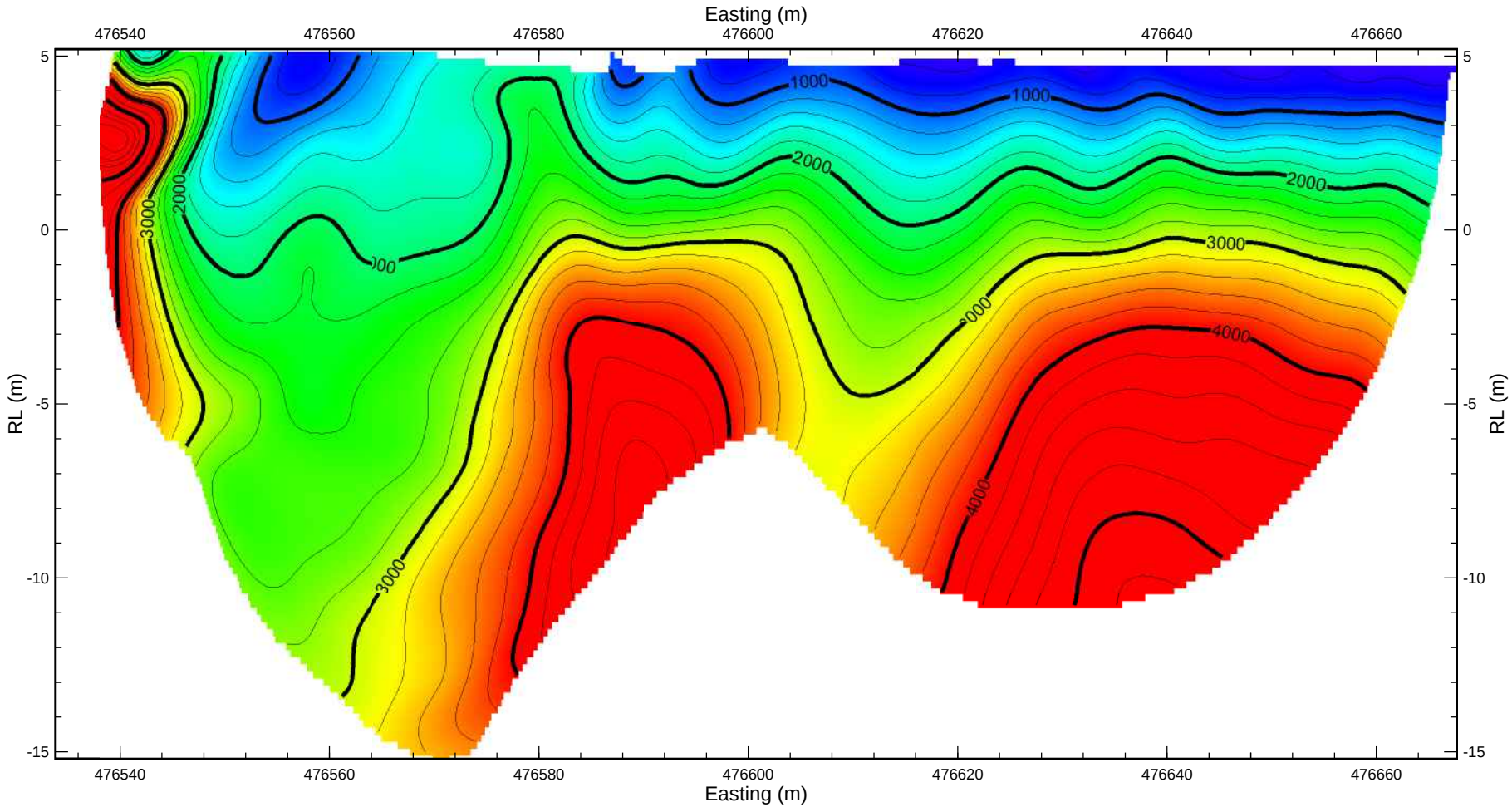
In general, V_p in the top 2 m reached up to ~1000-1400 m/s across the investigation area. SR01A displayed the highest V_p in the near-surface (top 2 m), with V_p up to 2200 m/s and >3000 m/s occurring in the top 2 m in two separate parts along the line. SR01A also displayed the lowest V_p at depth, with V_p<3000 m/s at depths up to ~15 m depth towards the western end of the line. Higher V_p such as 4000 m/s contour varied in depth across the investigation area, from ~0.5 m RL to ~-10 m RL, and between ~5-17 m depth from surface. SR03 displayed

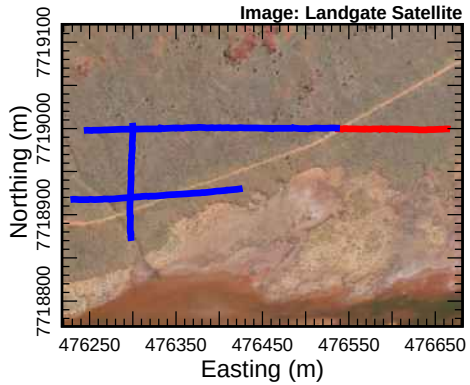
an isolated area of V_p>4000 m/s near the centre of the line at an approximate centre depth of ~8 m depth.

Downhole VSP data showed a V_p range of 756-1878 m/s and a V_s range of 291-519 m/s between 1-11 m depth at the borehole location.

An average site value of 94.81 Ωm was calculated for apparent soil resistivity. An average site value of 1.31 mK/W or 1.31 m-°C/W was calculated for thermal resistivity and 18.9% VWC for soil moisture (for measurements between 0 m depth and 0.8 m depth).

APPENDIX B – SEISMIC REFRACTION DATA SECTIONS





Scale 1 : 600

0m 10m 20m 30m 40m 50m

500 1000 1500 2000 2500 3000 3500 4000

Velocity (m/s)

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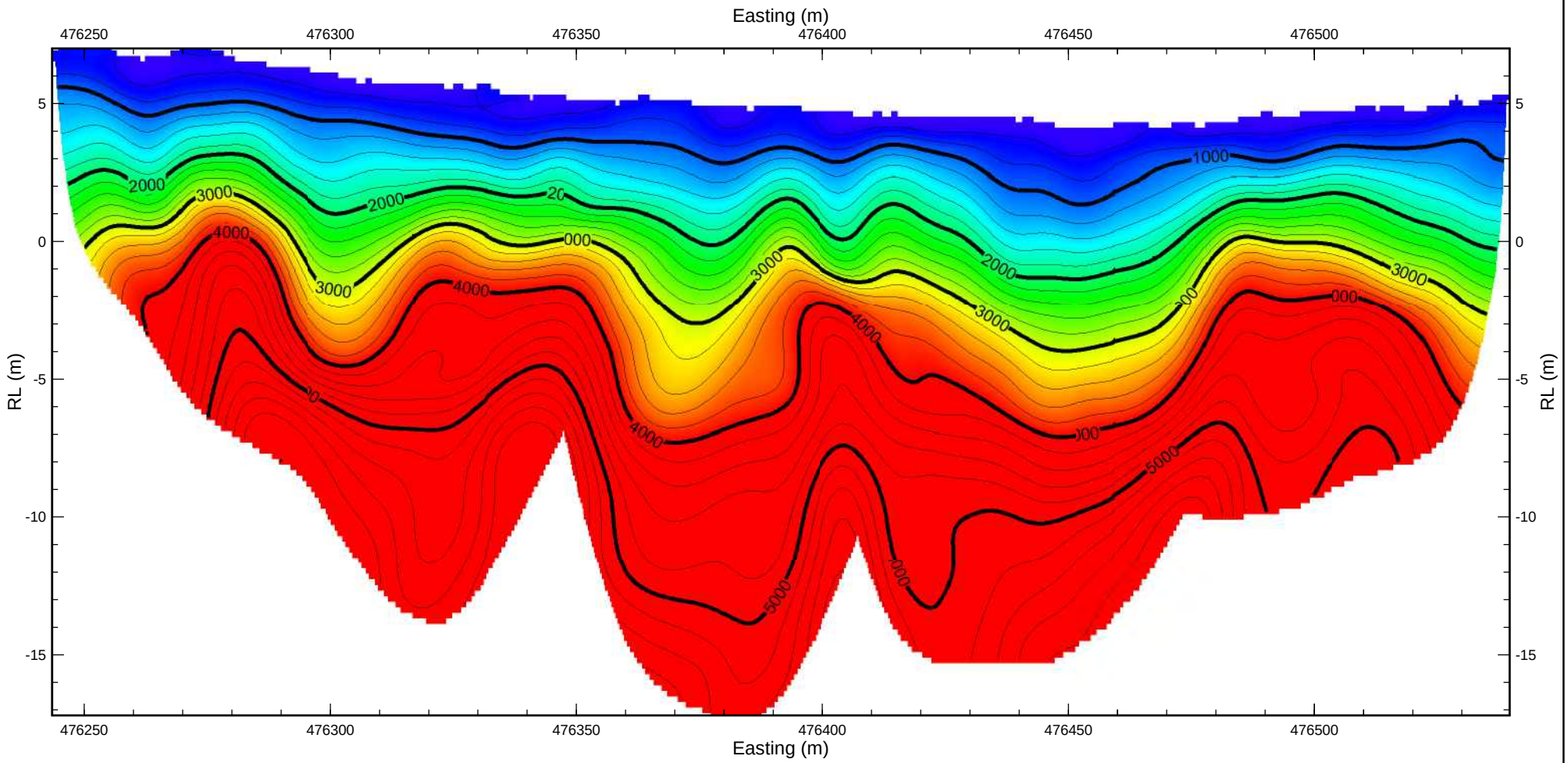
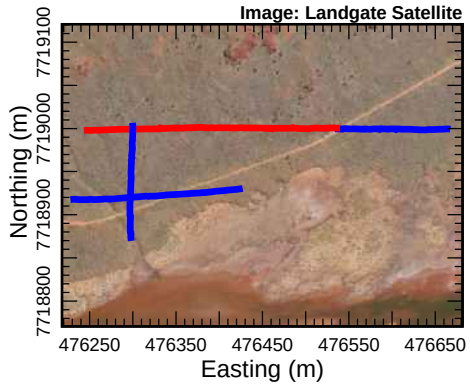
PERDAMAN

Seismic Refraction Profile SR01A

Author: B Morgan	Date: September 2020
Drawn: B Morgan	Revised:
Figure No: B1	Report No: DG1662COF_3.0
Projection: MGA 50	Scale: 1 : 600





Scale 1 : 1200

0m 20m 40m 60m 80m 100m

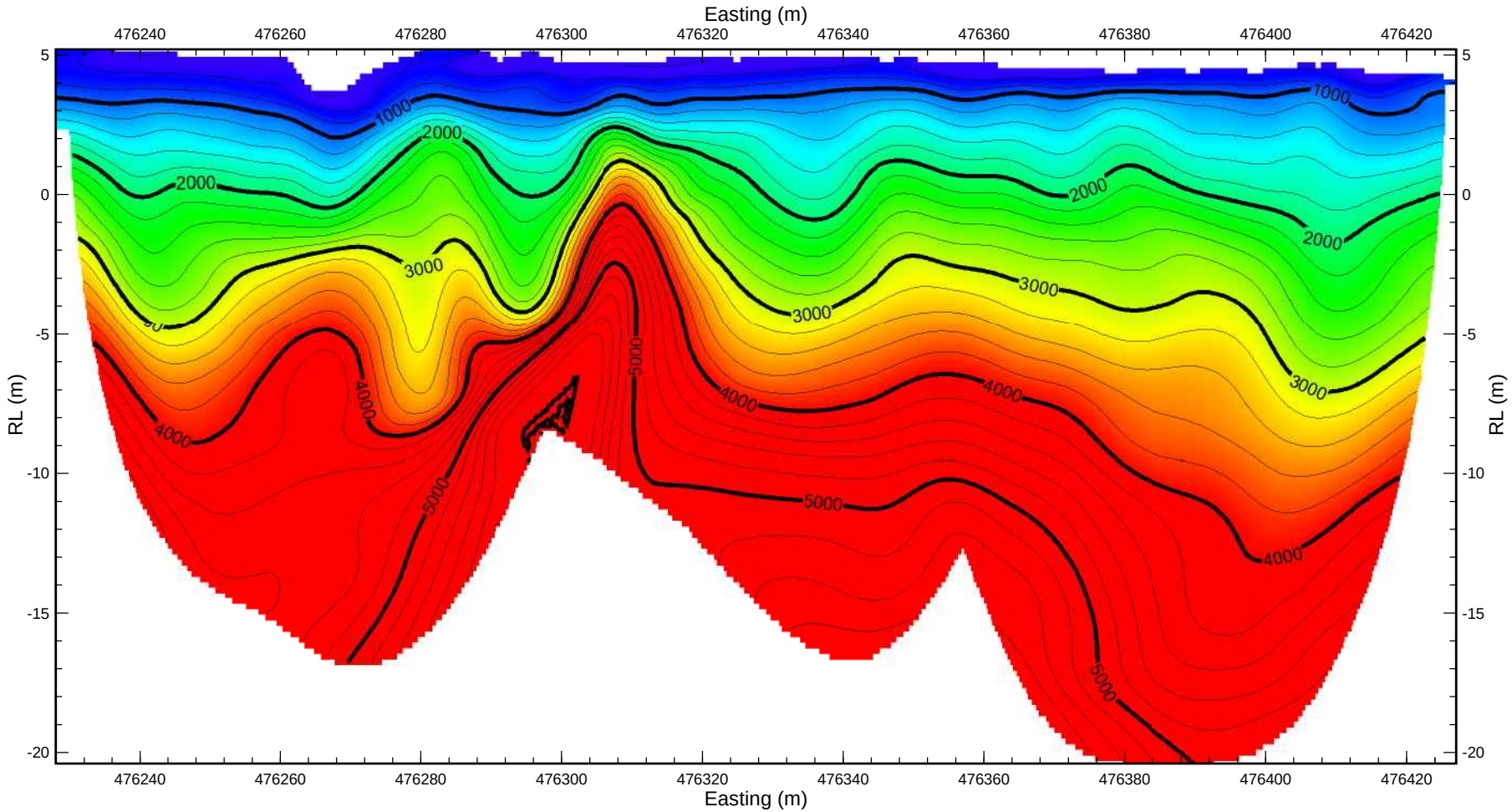
500 1000 1500 2000 2500 3000 3500 4000
Velocity (m/s)

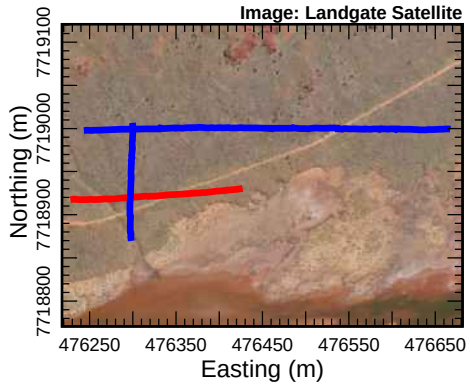
DRAIG GEOSCIENCE PTY LTD

PERDAMAN

Seismic Refraction Profile SR01B

Author: B Morgan	Date: September 2020
Drawn: B Morgan	Revised:
Figure No: B2	Report No: DG1662COF_3.0
Projection: MGA 50	Scale: 1 : 1200





Scale 1 : 900

0m 20m 40m 60m 70m

500 1000 1500 2000 2500 3000 3500 4000

Velocity (m/s)

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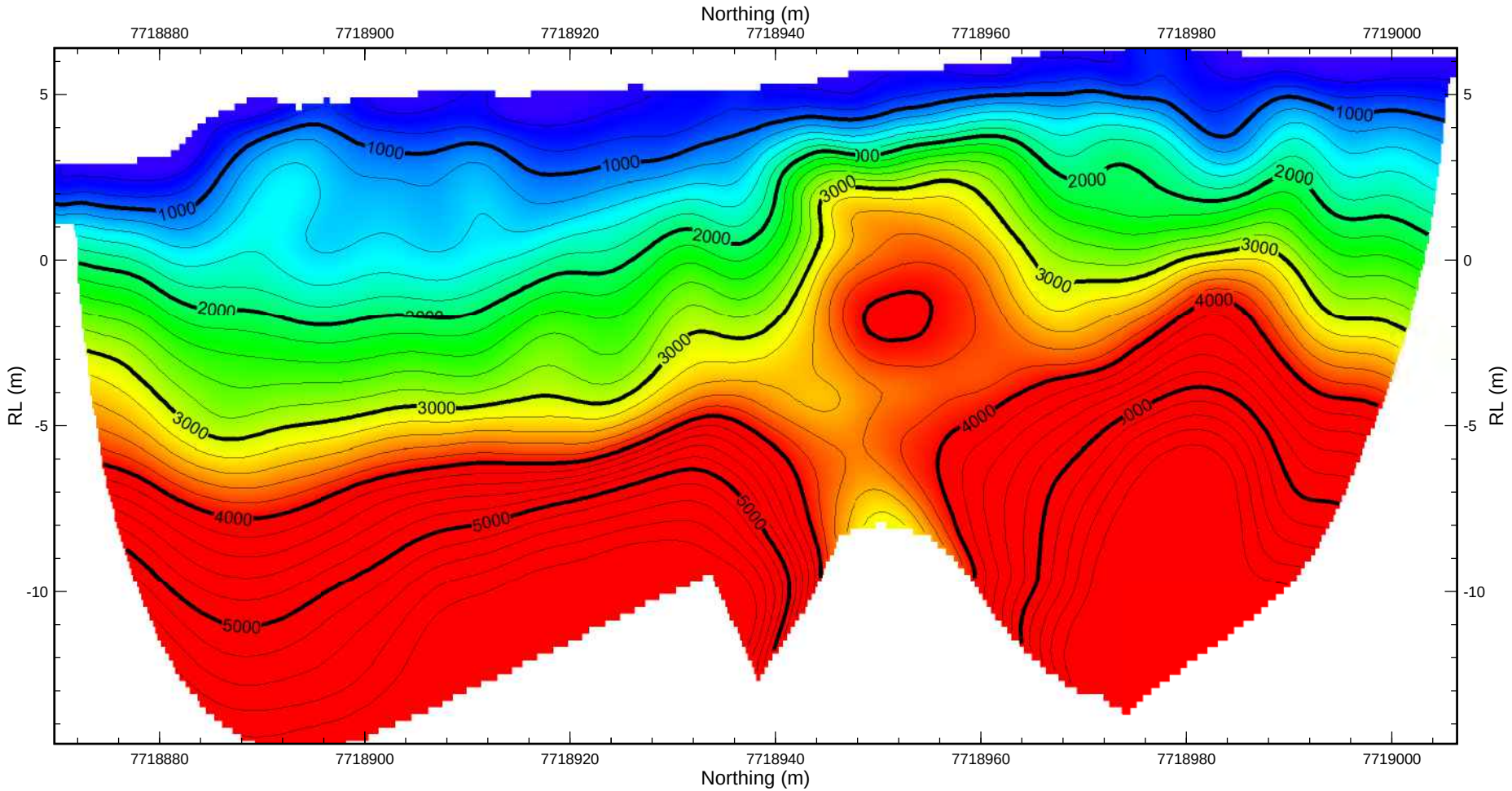
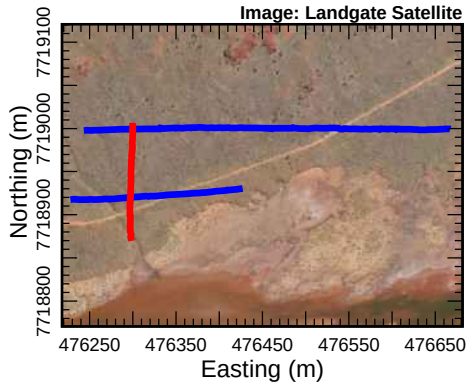
PERDAMAN

Seismic Refraction Profile SR02

Author: B Morgan	Date: September 2020
Drawn: B Morgan	Revised:
Figure No: B3	Report No: DG1662COF_3.0
Projection: MGA 50	Scale: 1 : 900





Scale 1 : 600

0m 10m 20m 30m 40m 50m

500 1000 1500 2000 2500 3000 3500 4000
Velocity (m/s)

DRAIG GEOSCIENCE PTY LTD

PERDAMAN

Seismic Refraction Profile SR03

Author: B Morgan	Date: September 2020
Drawn: B Morgan	Revised:
Figure No: B4	Report No: DG1662COF_3.0
Projection: MGA 50	Scale: 1 : 600

APPENDIX C – SOIL RESISTIVITY RESULTS

Figure C1 - Soil Resistivity Test WTT1

Location	Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
Test Point WTT1	N-S	0.5	93.90	93.80	93.80	294.79
		1	44.20	44.20	44.20	277.72
		3	13.49	13.50	13.50	254.41
		6	3.86	3.88	3.89	146.15

Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
E-W	0.5	111.40	111.20	111.20	349.55
	1	42.20	42.20	42.20	265.15
	3	13.73	13.73	13.72	258.74
	6	4.04	4.00	3.97	150.92

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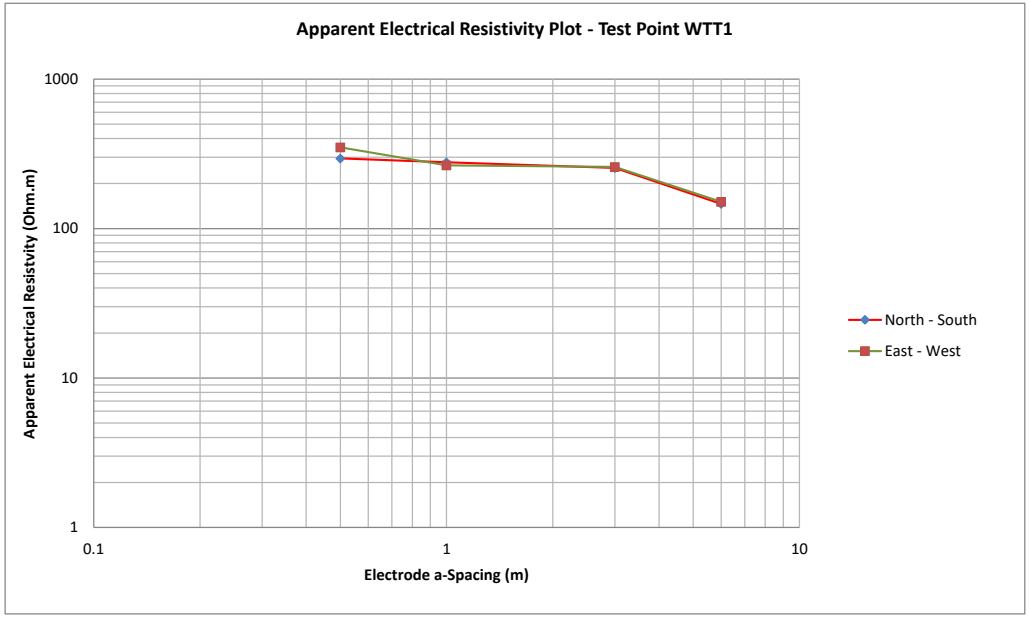
GPS Positions

	Easting	GDA94 MGAZ50 Northing	Distance (m)
North	476691	7718324	
Centre	476691	7718315	
South	476691	7718306	18
East	476700	7718314	
Centre	476691	7718315	
West	476682	7718315	18



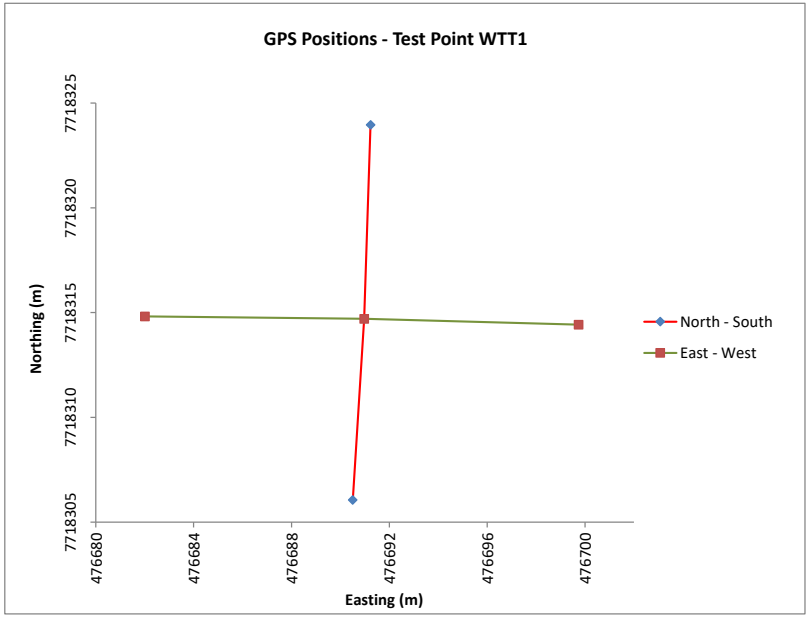


Figure C2 - Soil Resistivity Test WTT2

Location	Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
Test Point WTT2	N-S	0.5	0.37	0.37	0.37	1.16
		1	0.21	0.21	0.21	1.32
		3	0.11	0.10	0.10	1.95
		6	0.06	0.06	0.06	2.26

Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
E-W	0.5	0.33	0.33	0.33	1.04
	1	0.19	0.19	0.19	1.19
	3	0.09	0.09	0.09	1.70
	6	0.05	0.05	0.05	1.88

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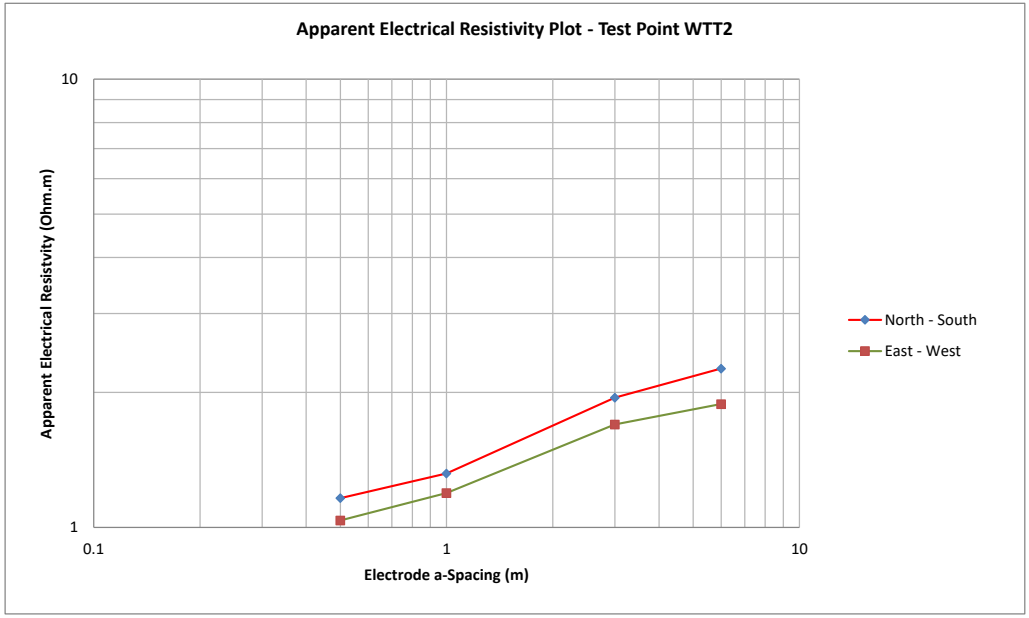
GPS Positions

	GDA94 MGAZ50 Easting	Northing	Distance (m)
North	476784	7718814	
Centre	476784	7718805	
South	476784	7718796	18
East	476793	7718806	
Centre	476784	7718805	
West	476775	7718804	18



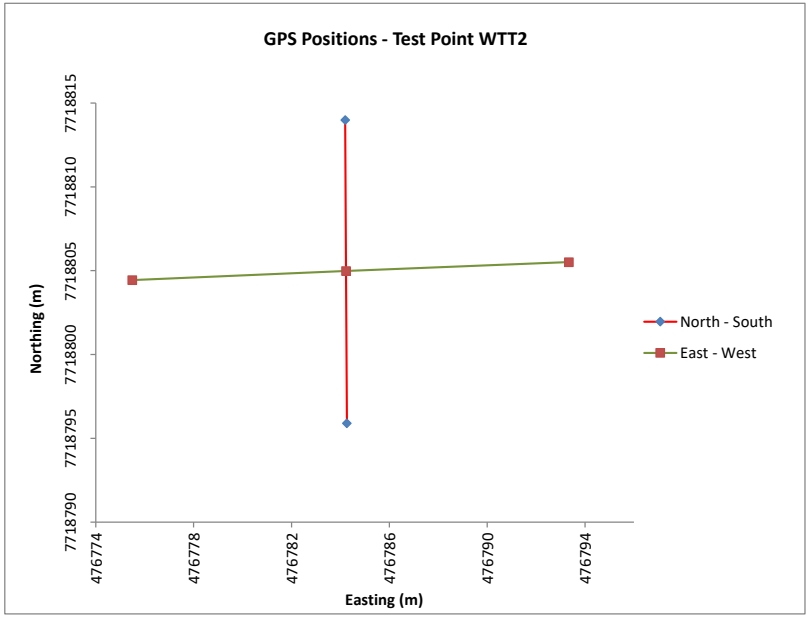


Figure C3 - Soil Resistivity Test WTT3

Location	Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
Test Point WTT3	N-S	0.5	8.56	8.55	8.55	26.87
		1	3.46	3.45	3.36	21.51
		3	1.28	1.28	1.28	24.13
		6	0.94	0.94	0.94	35.44

Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
E-W	0.5	9.86	9.86	9.86	30.98
	1	3.47	3.47	3.47	21.80
	3	1.18	1.17	1.17	22.12
	6	0.66	0.66	0.66	24.88

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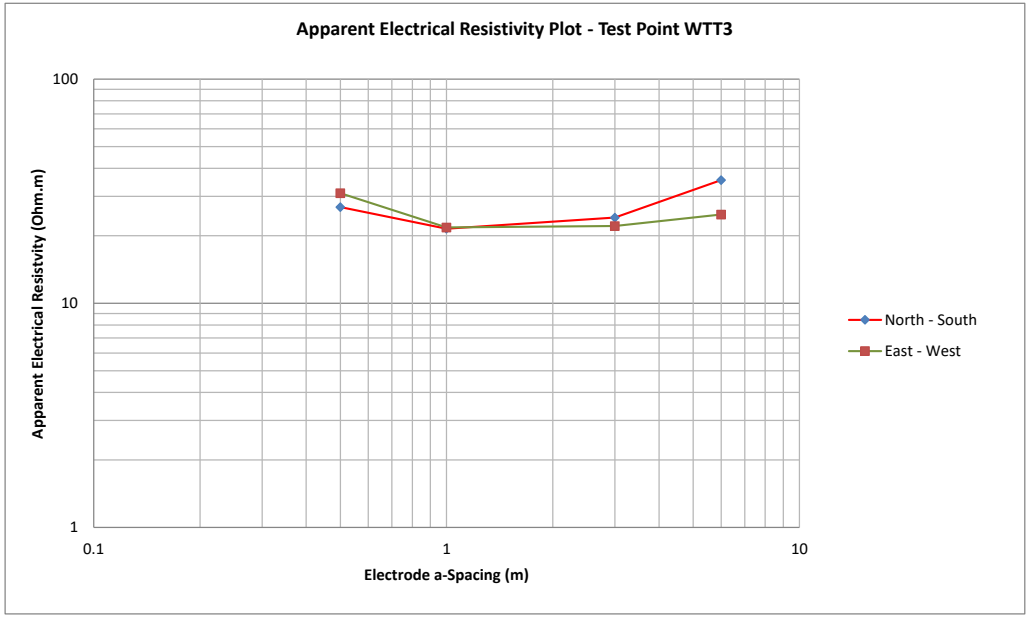
GPS Positions

	GDA94 MGAZ50 Easting	Northing	Distance (m)
North	476762	7718990	
Centre	476763	7718981	
South	476763	7718972	18
East	476772	7718981	
Centre	476763	7718981	
West	476754	7718980	18



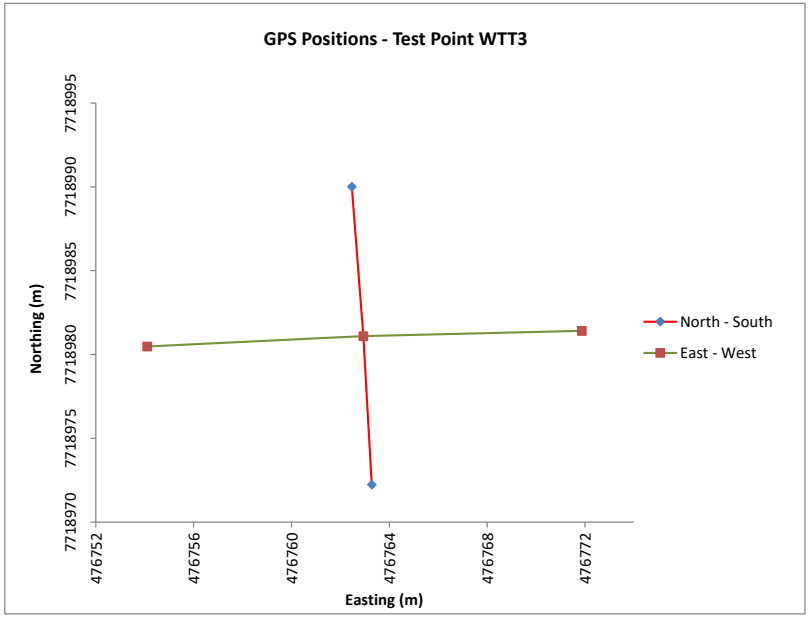


Figure C4 - Soil Resistivity Test WTT4

Location	Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
Test Point WTT4	N-S	0.5	181.00	180.70	180.60	567.90
		1	42.80	42.80	42.90	269.13
		3	6.90	6.91	6.91	130.19
		6	3.26	3.26	3.26	122.90

Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
E-W	0.5	62.10	66.20	69.50	207.14
	1	41.40	41.50	41.50	260.54
	3	6.64	6.65	6.65	125.29
	6	3.12	3.10	3.10	117.12

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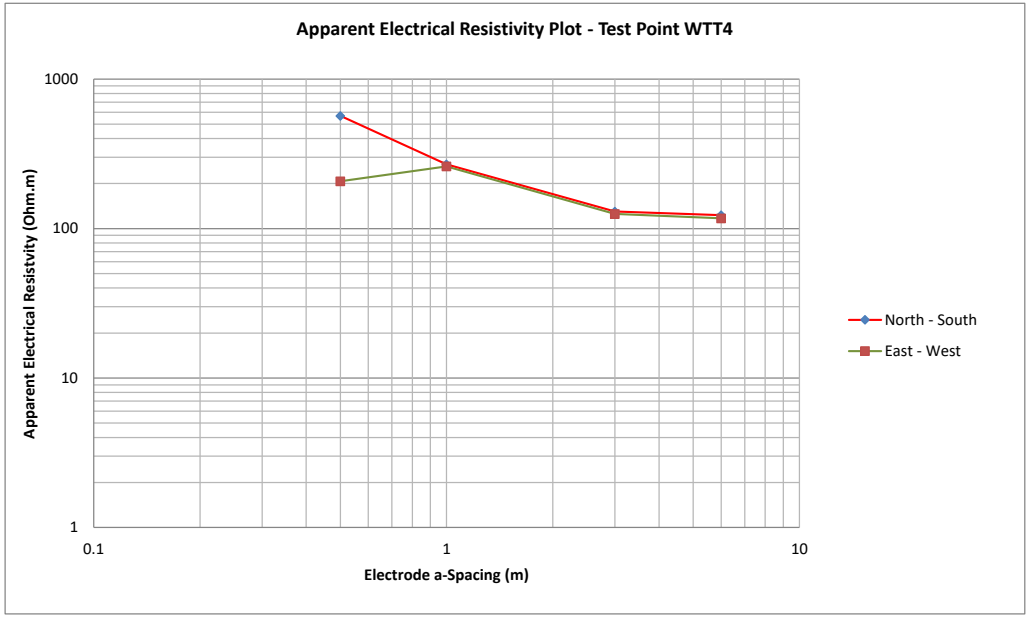
GPS Positions

	GDA94 MGAZ50 Easting	Northing	Distance (m)
North	476767	7719158	
Centre	476767	7719150	
South	476767	7719140	18
East	476776	7719151	
Centre	476767	7719150	
West	476758	7719148	18



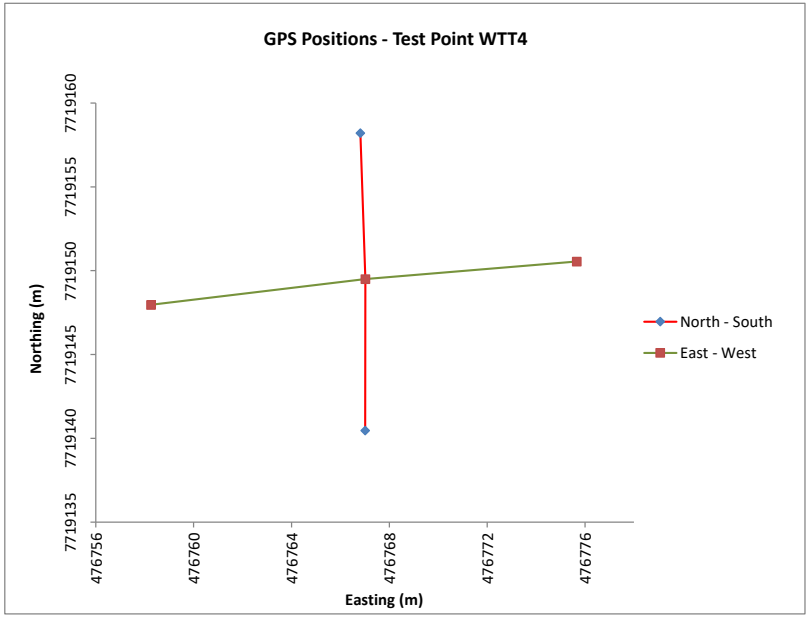


Figure C5 - Soil Resistivity Test WTT5

Location	Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
Test Point WTT5	N-S	0.5	0.15	0.15	0.15	0.47
		1	0.07	0.07	0.07	0.44
		3	0.02	0.02	0.02	0.38
		6	0.01	0.01	0.01	0.38

Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
E-W	0.5	0.17	0.17	0.17	0.53
	1	0.06	0.06	0.06	0.38
	3	0.02	0.02	0.02	0.38
	6	0.01	0.01	0.01	0.38

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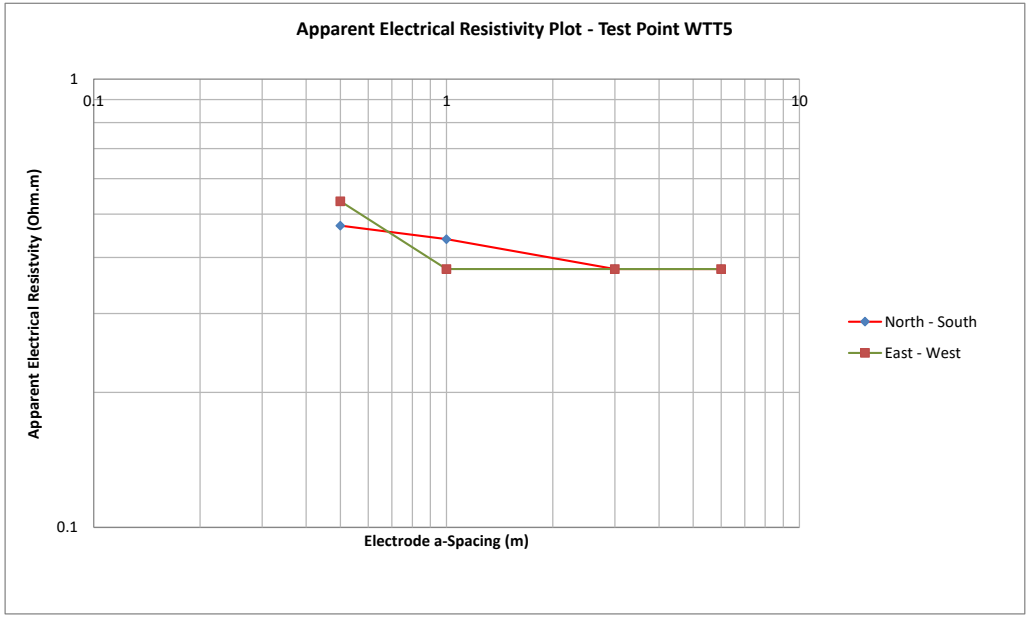
GPS Positions

	Easting	GDA94 MGAZ50 Northing	Distance (m)
North	476645	7718801	
Centre	476644	7718792	
South	476644	7718783	18
East	476653	7718792	
Centre	476644	7718792	
West	476635	7718793	18



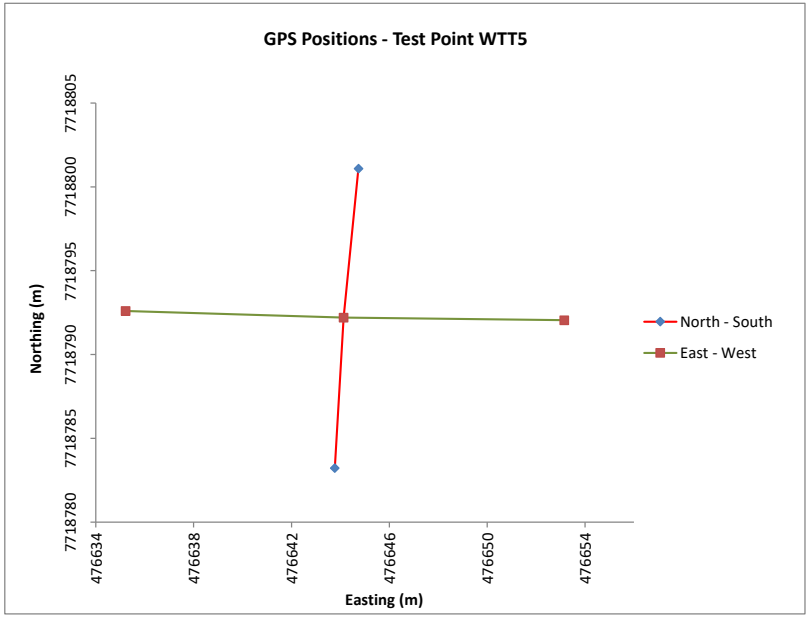


Figure C6 - Soil Resistivity Test WTT6

Location	Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
Test Point WTT6	N-S	0.5	29.30	29.30	29.30	92.05
		1	6.37	6.37	6.37	40.02
		3	1.29	1.27	1.25	23.94
		6	1.01	1.01	1.01	38.08

Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
E-W	0.5	31.90	31.90	31.90	100.22
	1	5.04	5.04	5.04	31.67
	3	0.90	0.91	0.91	17.09
	6	0.36	0.36	0.37	13.70

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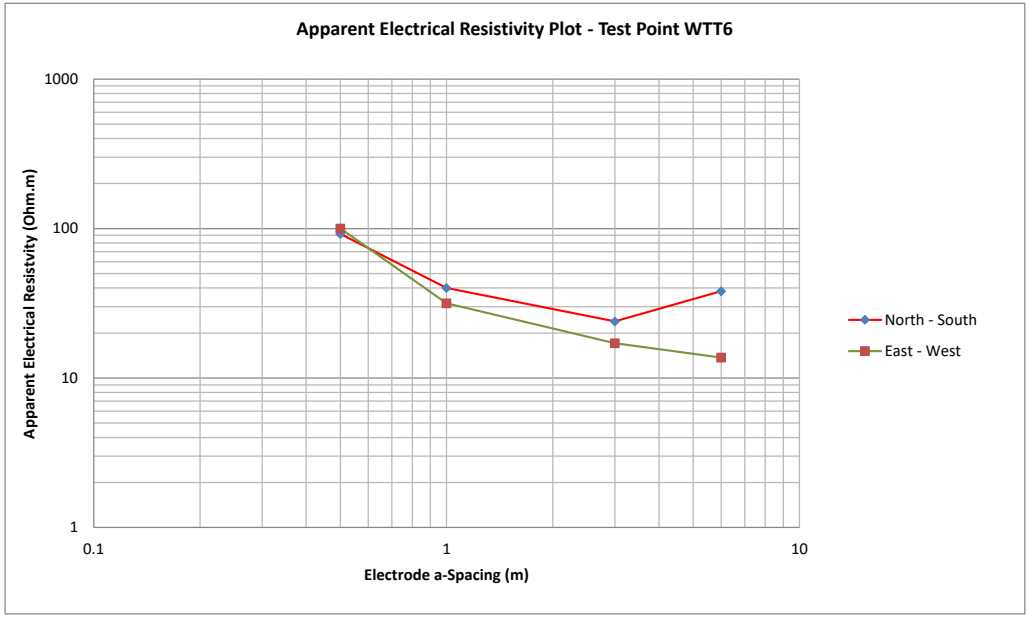
GPS Positions

	Easting	GDA94 MGAZ50 Northing	Distance (m)
North	476613	7718967	
Centre	476612	7718958	
South	476612	7718949	18
East	476621	7718957	
Centre	476612	7718958	
West	476604	7718958	18



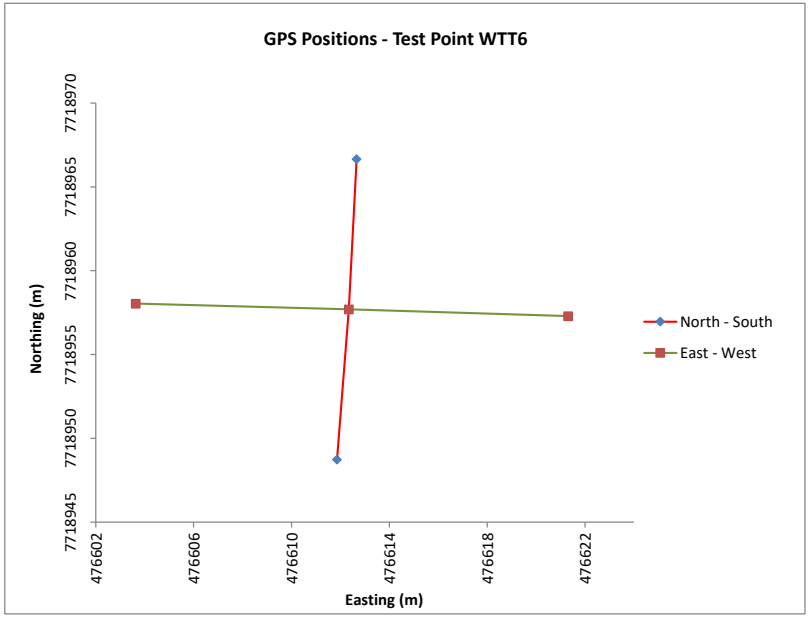


Figure C7 - Soil Resistivity Test WTT7

Location	Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
Test Point WTT7	N-S	0.5	0.16	0.16	0.16	0.50
		1	0.06	0.07	0.06	0.40
		3	0.02	0.02	0.02	0.38
		6	0.01	0.01	0.01	0.38

Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
E-W	0.5	0.18	0.18	0.18	0.57
	1	0.06	0.06	0.06	0.38
	3	0.02	0.02	0.02	0.38
	6	0.01	0.01	0.01	0.38

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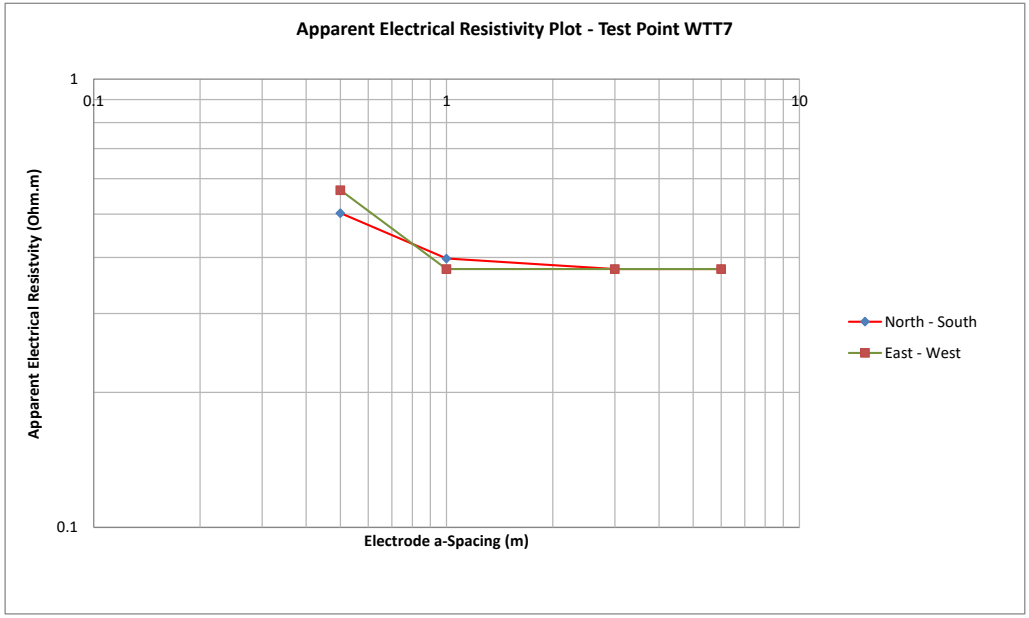
GPS Positions

	GDA94 MGAZ50 Easting	Northing	Distance (m)
North	476375	7718774	
Centre	476374	7718765	
South	476374	7718756	18
East	476383	7718764	
Centre	476374	7718765	
West	476366	7718765	18



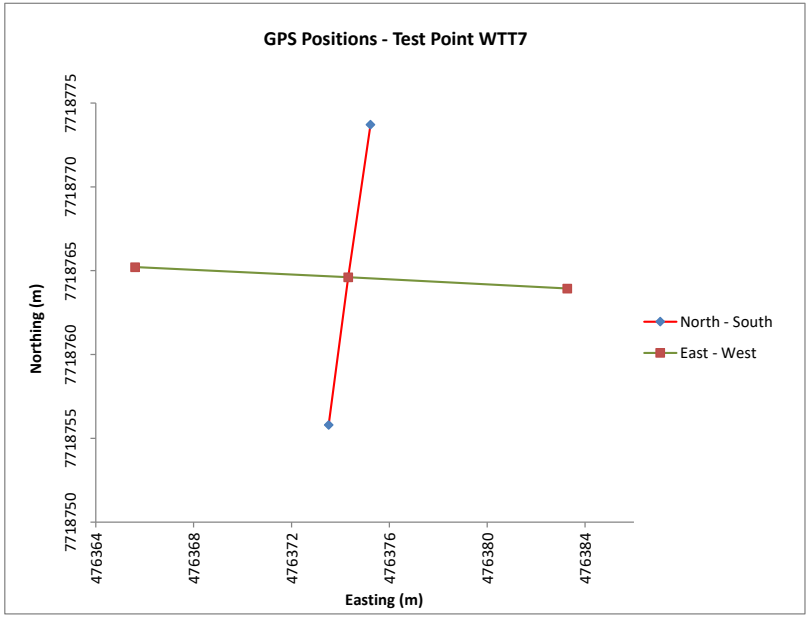


Figure C8 - Soil Resistivity Test WTT8

Location	Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
Test Point WTT8	N-S	0.5	84.80	84.80	84.80	266.41
		1	25.80	25.80	25.80	162.11
		3	3.42	3.42	3.42	64.47
		6	0.57	0.56	0.56	21.24

Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
E-W	0.5	81.60	81.60	81.60	256.35
	1	23.10	23.10	23.10	145.14
	3	4.66	4.65	4.65	87.71
	6	0.65	0.65	0.65	24.50

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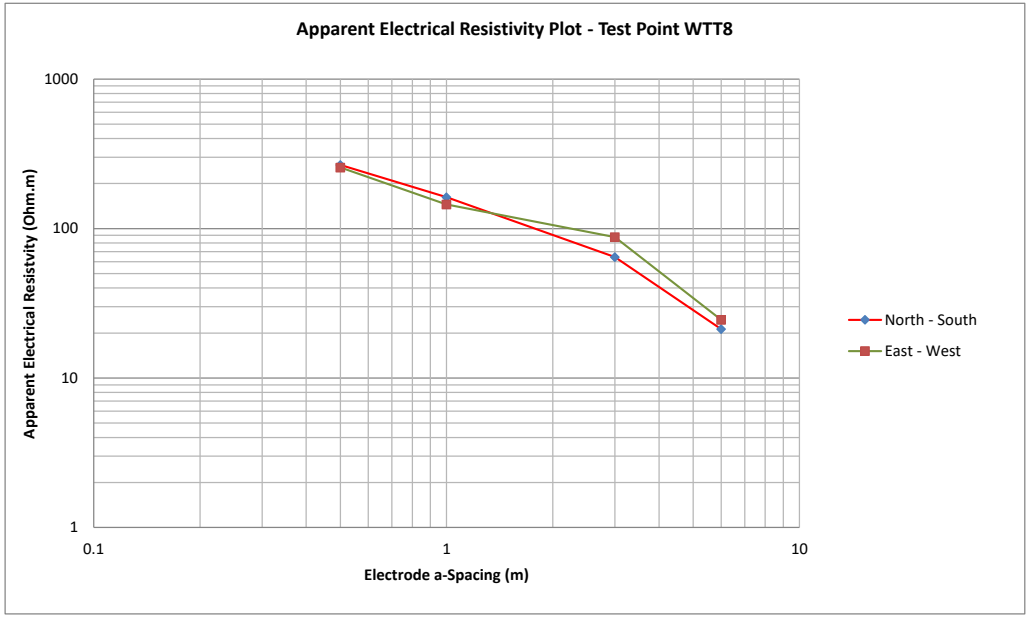
GPS Positions

	Easting	GDA94 MGAZ50 Northing	Distance (m)
North	476326	7718959	
Centre	476325	7718950	
South	476324	7718942	18
East	476333	7718949	
Centre	476325	7718950	
West	476316	7718952	18



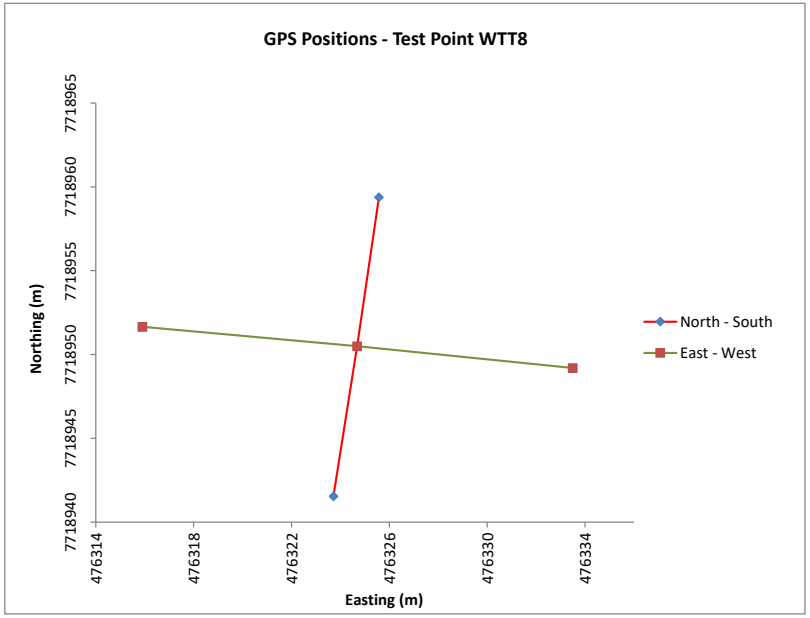


Figure C9 - Soil Resistivity Test WTT9

Location	Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
Test Point WTT9	N-S	0.5	0.36	0.36	0.36	1.13
		1	0.14	0.14	0.14	0.88
		3	0.04	0.04	0.04	0.75
		6	0.03	0.03	0.03	1.13

Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
E-W	0.5	0.31	0.31	0.31	0.97
	1	0.14	0.14	0.14	0.88
	3	0.04	0.04	0.04	0.75
	6	0.03	0.03	0.03	1.13

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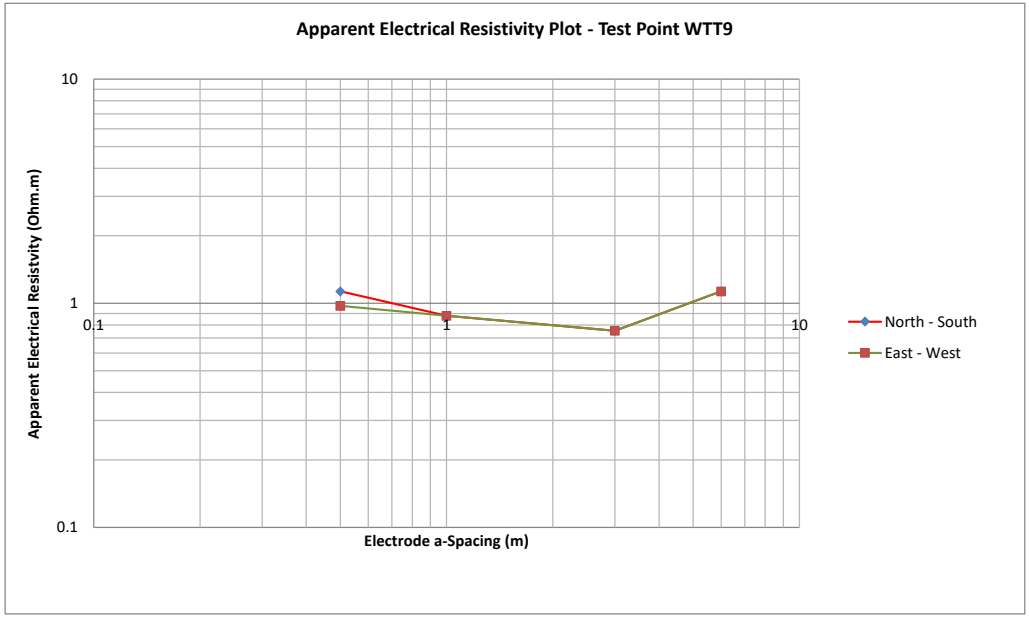
GPS Positions

	Easting	GDA94 MGAZ50 Northing	Distance (m)
North	476191	7718796	
Centre	476190	7718787	
South	476188	7718778	18
East	476198	7718786	
Centre	476190	7718787	
West	476181	7718788	18



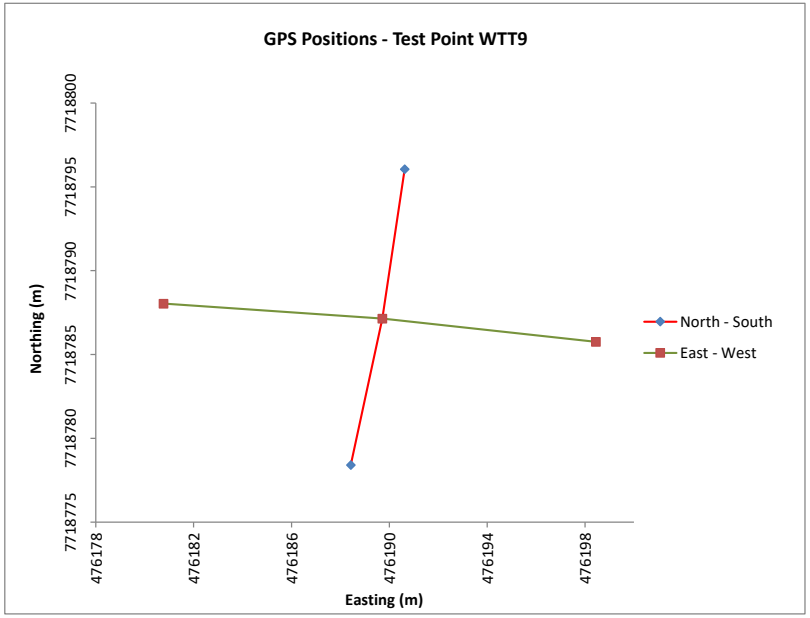


Figure C10 - Soil Resistivity Test WTT10

Location	Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
Test Point WTT10	N-S	0.5	11.84	11.83	11.84	37.19
		1	9.42	9.43	9.45	59.27
		3	6.82	6.82	6.81	128.49
		6	5.91	5.91	5.91	222.80

Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
E-W	0.5	10.65	10.66	10.68	33.50
	1	9.74	9.68	9.67	60.93
	3	6.83	6.83	6.83	128.74
	6	5.27	5.27	5.27	198.67

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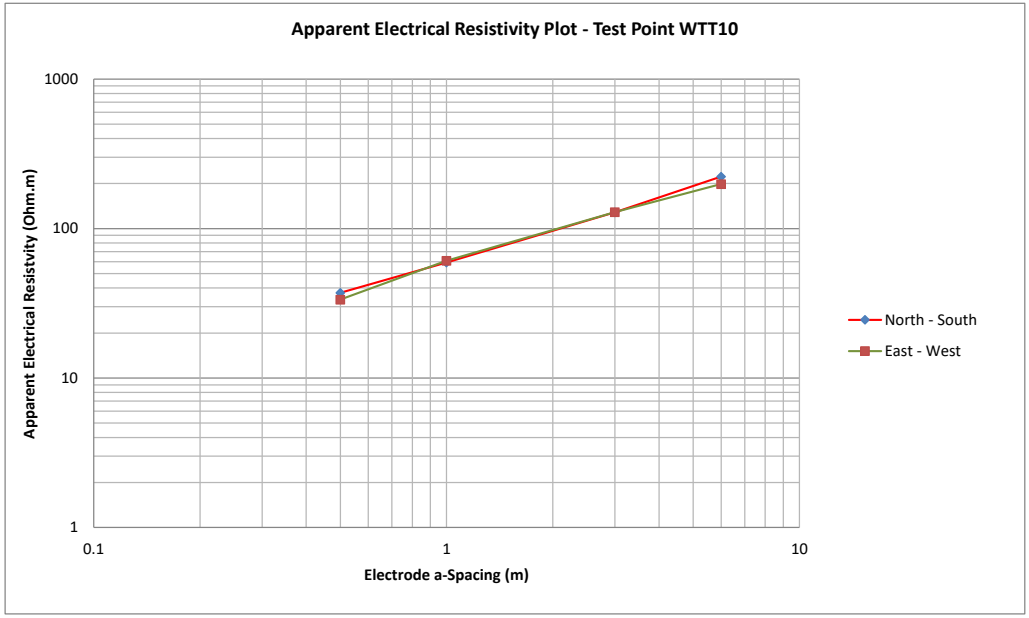
GPS Positions

	Easting	GDA94 MGAZ50 Northing	Distance (m)
North	473928	7720039	
Centre	473928	7720030	
South	473928	7720021	18
East	473937	7720030	
Centre	473928	7720030	
West	473919	7720030	18



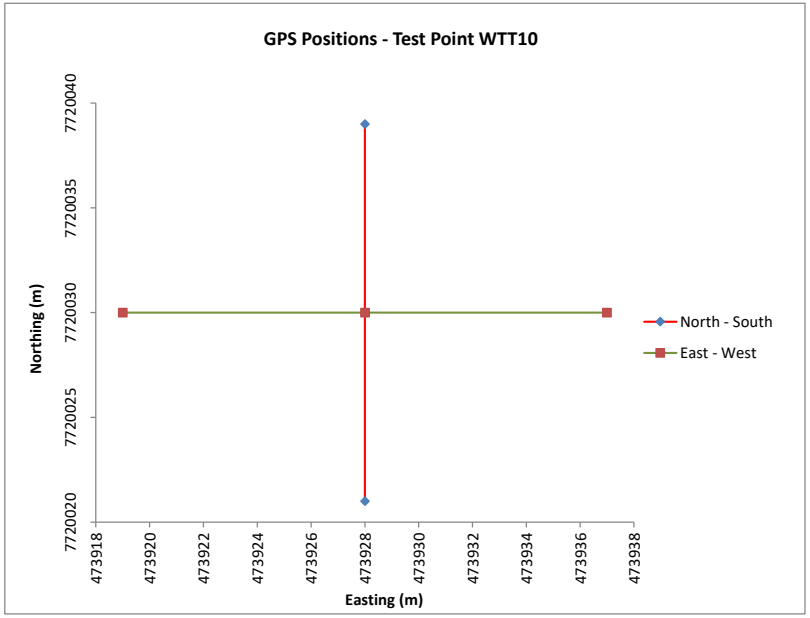


Figure C11 - Soil Resistivity Test WTT11

Location	Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
Test Point WTT11	N-S	0.5	37.50	37.50	37.40	117.71
		1	27.40	27.30	27.20	171.53
		3	10.66	10.67	10.66	201.00
		6	7.86	7.87	7.87	296.57

Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
E-W	0.5	43.70	43.20	42.70	135.72
	1	20.00	20.10	20.10	126.08
	3	13.20	13.19	13.19	248.69
	6	8.39	8.40	8.39	316.42

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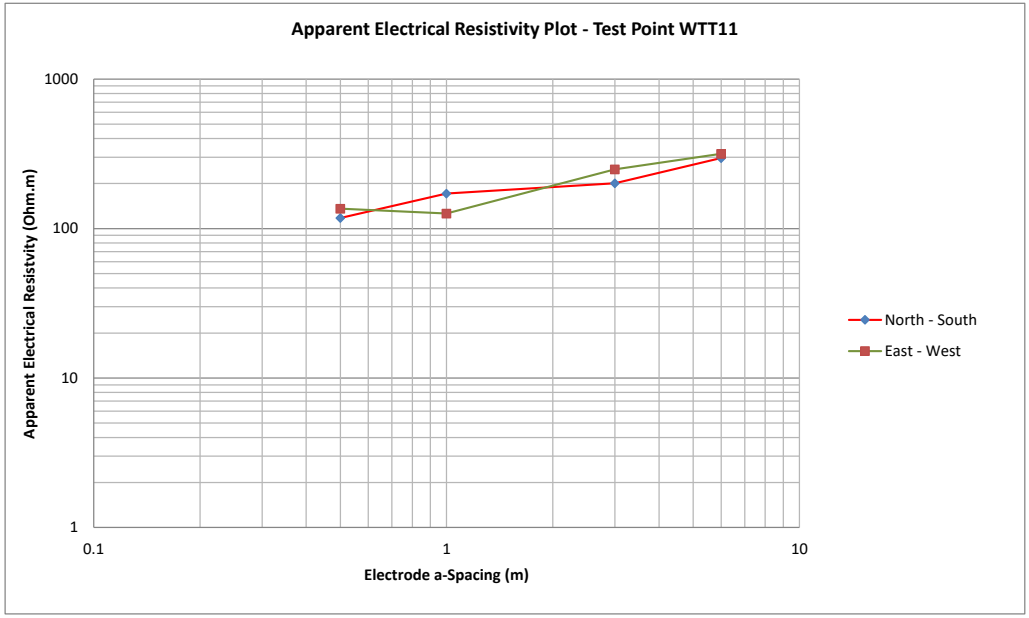
GPS Positions

	Easting	GDA94 MGAZ50 Northing	Distance (m)
North	473945	7720184	
Centre	473944	7720175	
South	473943	7720166	18
East	473953	7720174	
Centre	473944	7720175	
West	473935	7720175	18



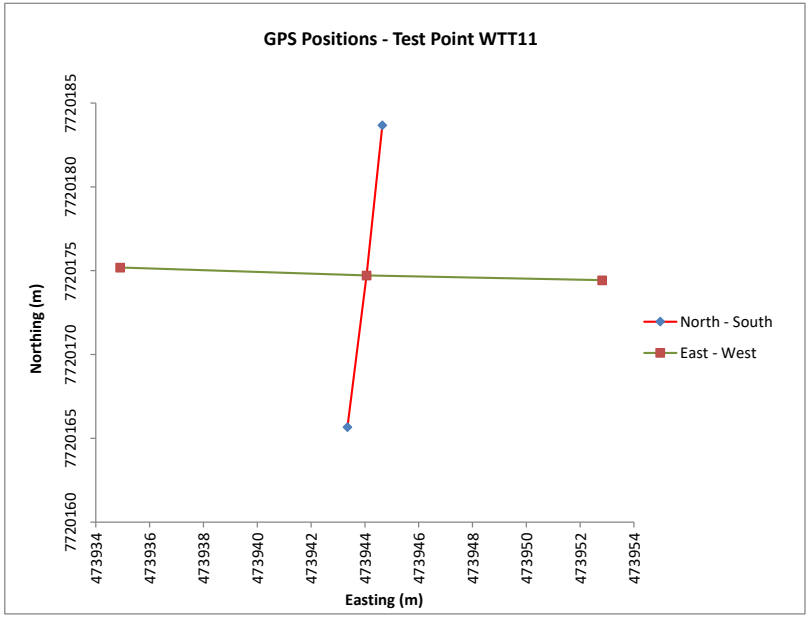


Figure C12 - Soil Resistivity Test WT1

Location	Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
Test Point WT1	N-S	0.5	0.11	0.11	0.11	0.35
		1	0.05	0.05	0.05	0.31
		3	0.01	0.01	0.01	0.19
		6	0.01	0.01	0.01	0.38

Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
E-W	0.5	0.13	0.13	0.13	0.41
	1	0.05	0.05	0.05	0.31
	3	0.01	0.01	0.01	0.19
	6	0.01	0.01	0.01	0.38

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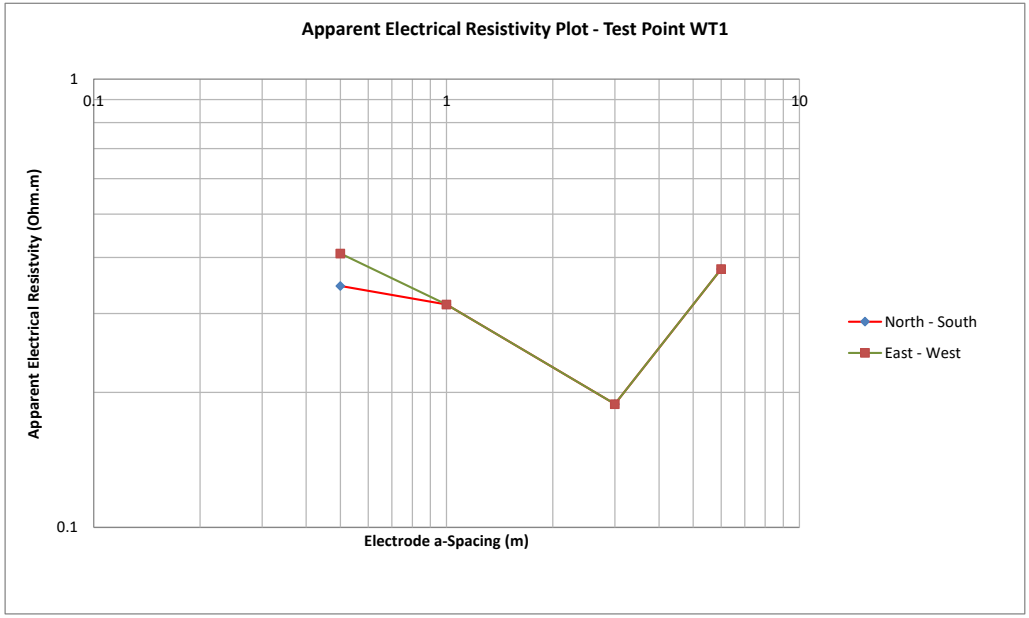
GPS Positions

	Easting	GDA94 MGAZ50 Northing	Distance (m)
North	476362	7718858	
Centre	476362	7718849	
South	476361	7718840	18
East	476371	7718849	
Centre	476362	7718849	
West	476353	7718849	18



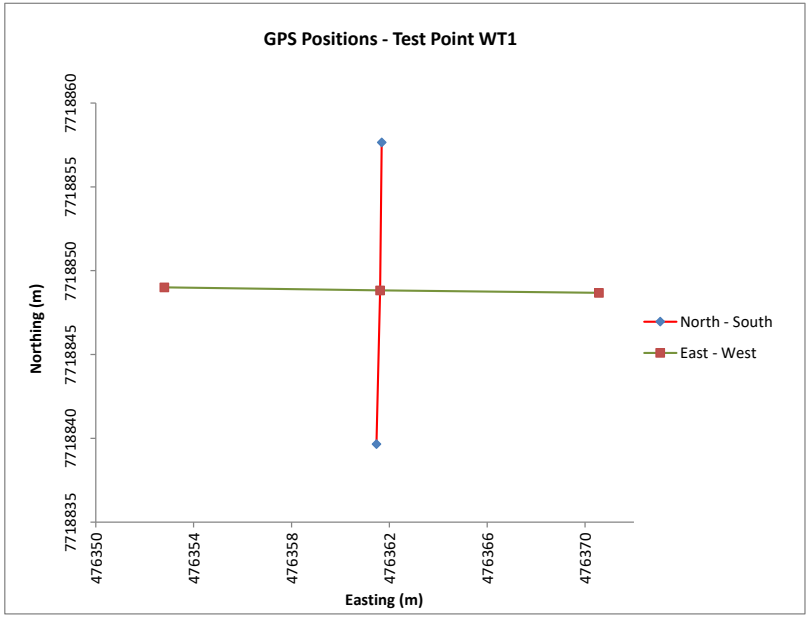


Figure C13 - Soil Resistivity Test WT2

Location	Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
Test Point WT2	N-S	0.5	136.40	136.60	136.70	429.04
		1	48.80	48.10	47.30	302.01
		3	4.44	4.46	4.51	84.26
		6	2.94	2.95	2.96	111.21

Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
E-W	0.5	133.50	134.10	134.50	421.08
	1	35.20	35.20	35.20	221.17
	3	4.88	4.88	4.88	91.99
	6	3.25	3.25	3.25	122.52

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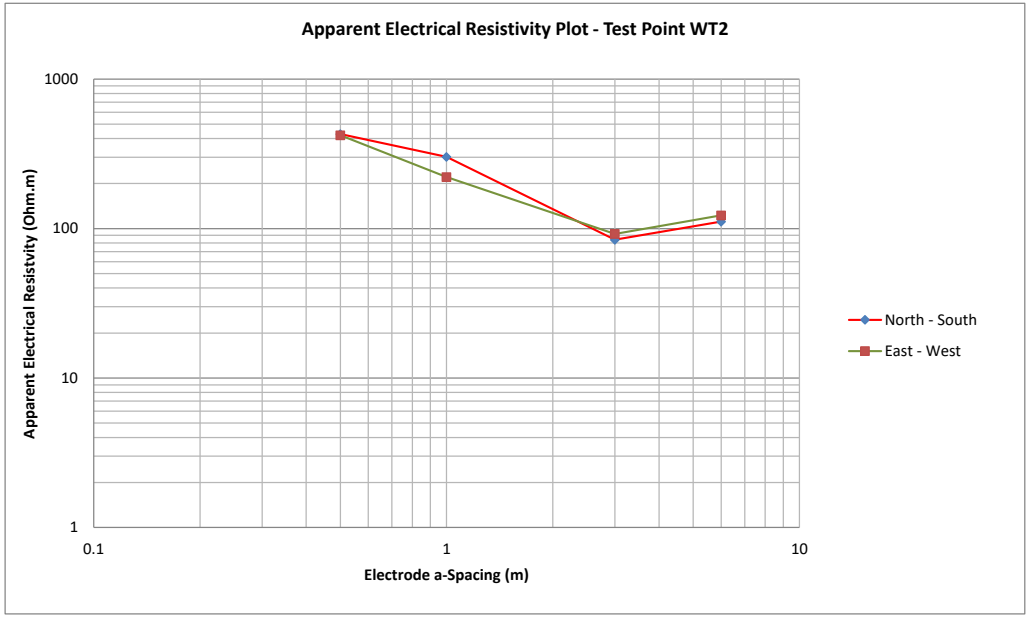
GPS Positions

	GDA94 MGAZ50 Easting	Northing	Distance (m)
North	476160	7719075	
Centre	476160	7719066	
South	476161	7719057	18
East	476169	7719065	
Centre	476160	7719066	
West	476152	7719067	18



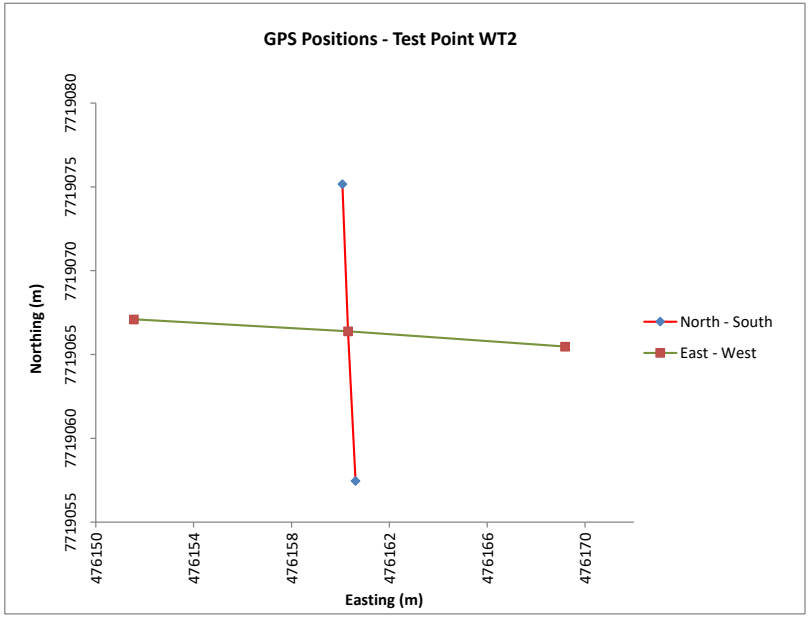


Figure C14 - Soil Resistivity Test WT3

Location	Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
Test Point WT3	N-S	0.5	15.02	15.01	15.01	47.17
		1	6.67	6.73	6.75	42.20
		3	3.28	3.28	3.27	61.76
		6	1.76	1.76	1.76	66.35

Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
E-W	0.5	10.45	10.59	10.64	33.18
	1	9.28	9.28	9.29	58.33
	3	3.70	3.70	3.71	69.81
	6	2.07	2.07	2.07	78.04

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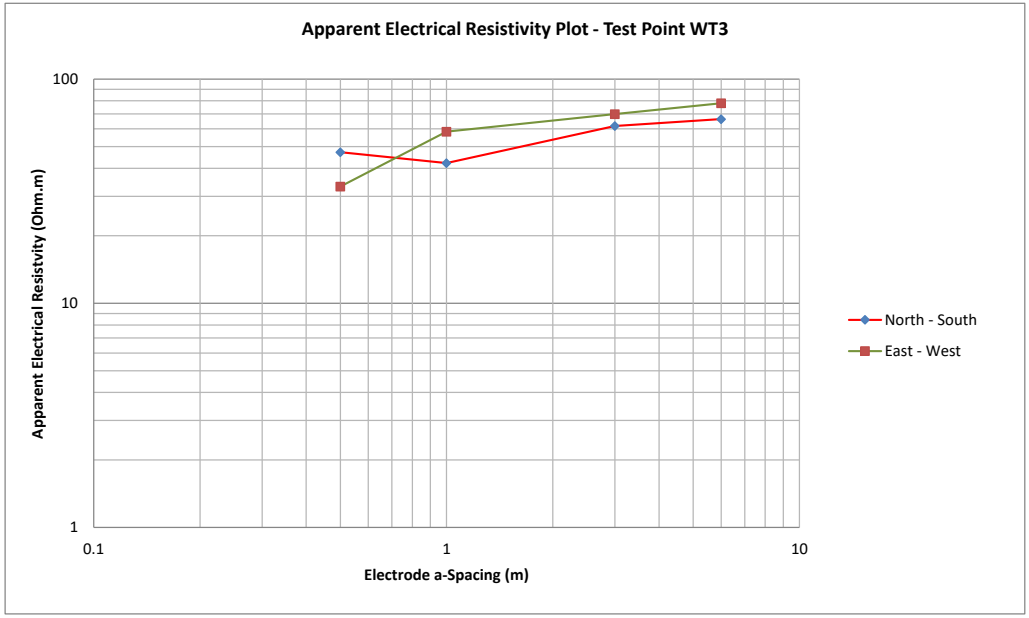
GPS Positions

	Easting	GDA94 MGAZ50 Northing	Distance (m)
North	475931	7719327	
Centre	475931	7719319	
South	475930	7719310	18
East	475940	7719318	
Centre	475931	7719319	
West	475922	7719319	18



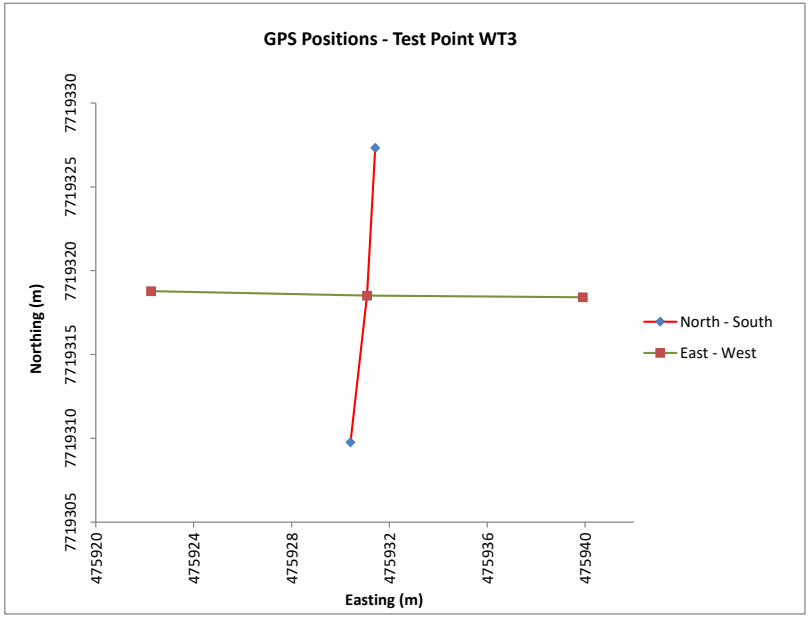


Figure C15 - Soil Resistivity Test WT4

Location	Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
Test Point WT4	N-S	0.5	79.50	79.90	79.90	250.59
		1	26.90	27.50	28.40	173.42
		3	5.87	5.86	5.85	110.46
		6	1.39	1.37	1.37	51.90

Direction	Electrode a-Spacing (m)	Reading 1 Measured Resistance (Ω)	Reading 2 Measured Resistance (Ω)	Reading 3 Measured Resistance (Ω)	Apparent Electrical Resistivity ρ (Ω.m)
E-W	0.5	100.50	97.10	95.80	307.25
	1	24.70	24.70	24.70	155.19
	3	6.53	6.52	6.52	122.96
	6	1.65	1.66	1.66	62.45

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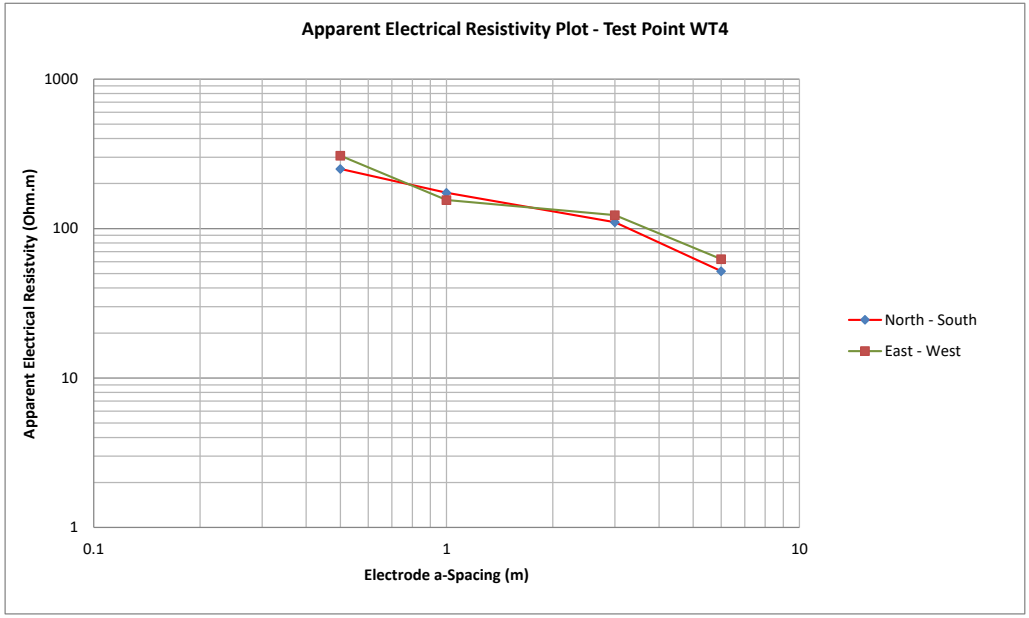
GPS Positions

	Easting	GDA94 MGAZ50 Northing	Distance (m)
North	475985	7719425	
Centre	475987	7719416	
South	475989	7719408	18
East	475996	7719417	
Centre	475987	7719416	
West	475978	7719415	18



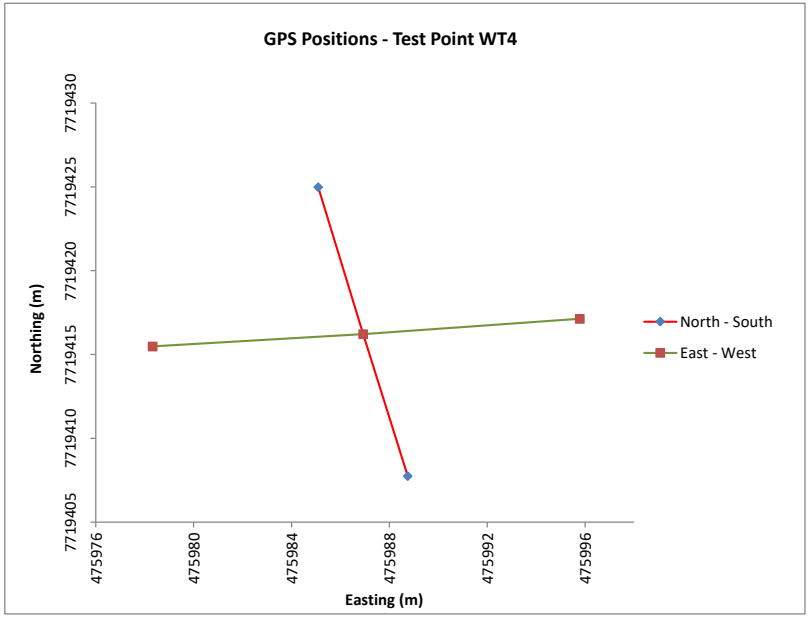


Figure C16 - Soil Resistivity Results Table

Test Point	Depth of Test (metres)	Soil Resistivity		
		North South Reading-OhmM	East West Reading-OhmM	Average Soil Resistivity-OhmM
WTT1	0.5	294.79	349.55	322.17
	1	277.72	265.15	271.43
	3	254.41	258.74	256.57
	6	146.15	150.92	148.53
WTT2	0.5	1.16	1.04	1.10
	1	1.32	1.19	1.26
	3	1.95	1.70	1.82
	6	2.26	1.88	2.07
WTT3	0.5	26.87	30.98	28.92
	1	21.51	21.80	21.66
	3	24.13	22.12	23.12
	6	35.44	24.88	30.16
WTT4	0.5	567.90	207.14	387.52
	1	269.13	260.54	264.84
	3	130.19	125.29	127.74
	6	122.90	117.12	120.01
WTT5	0.5	0.47	0.53	0.50
	1	0.44	0.38	0.41
	3	0.38	0.38	0.38
	6	0.38	0.38	0.38
WTT6	0.5	92.05	100.22	96.13
	1	40.02	31.67	35.85
	3	23.94	17.09	20.51
	6	38.08	13.70	25.89
WTT7	0.5	0.50	0.57	0.53
	1	0.40	0.38	0.39
	3	0.38	0.38	0.38
	6	0.38	0.38	0.38
WTT8	0.5	266.41	256.35	261.38
	1	162.11	145.14	153.62
	3	64.47	87.71	76.09
	6	21.24	24.50	22.87
WTT9	0.5	1.13	0.97	1.05
	1	0.88	0.88	0.88
	3	0.75	0.75	0.75
	6	1.13	1.13	1.13
WTT10	0.5	37.19	33.50	35.35
	1	59.27	60.93	60.10
	3	128.49	128.74	128.62
	6	222.80	198.67	210.74
WTT11	0.5	117.71	135.72	126.72
	1	171.53	126.08	148.81
	3	201.00	248.69	224.85
	6	296.57	316.42	306.50
WT1	0.5	0.35	0.41	0.38
	1	0.31	0.31	0.31
	3	0.19	0.19	0.19
	6	0.38	0.38	0.38
WT2	0.5	429.04	421.08	425.06
	1	302.01	221.17	261.59
	3	84.26	91.99	88.12
	6	111.21	122.52	116.87
WT3	0.5	47.17	33.18	40.17
	1	42.20	58.33	50.27
	3	61.76	69.81	65.78
	6	66.35	78.04	72.19
WT4	0.5	250.59	307.25	278.92
	1	173.42	155.19	164.31
	3	110.46	122.96	116.71
	6	51.90	62.45	57.18
Average Soil Resistivity (Ohm-Meter):				**94.81**

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APPENDIX D – THERMAL RESISTIVITY AND SOIL MOISTURE RESULTS

Figure D1 - Thermal Resistivity Results Table

Test Point	Depth of Test (metres)	Thermal Conductivity		Thermal Resistivity	
		Reading (W / mK)	Reading (W / m-°C)	Reading (mK / W)	Reading (m-°C / W)
WTT1	0	0.43	0.43	2.34	2.34
WTT2	0.2	8.49	8.49	0.12	0.12
WTT3	0.2	2.00	2.00	0.50	0.50
WTT4	0	0.25	0.25	4.08	4.08
WTT5	0.4	1.34	1.34	0.75	0.75
	0.6	3.27	3.27	0.31	0.31
WTT6	0	0.76	0.76	1.32	1.32
	0.2	1.22	1.22	0.82	0.82
WTT7	0.4	1.92	1.92	0.52	0.52
	0.8	2.81	2.81	0.36	0.36
WTT8	0	0.70	0.70	1.42	1.42
	0.2	0.47	0.47	2.13	2.13
WTT9	0.4	1.60	1.60	0.62	0.62
	0.8	4.15	4.15	0.24	0.24
WTT10	0	0.42	0.42	2.39	2.39
WTT11	0	0.33	0.33	3.02	3.02
TT1	0	0.66	0.66	1.52	1.52
	0.2	0.90	0.90	1.11	1.11
	Site Average (all readings)	**1.76**	**1.76**	**1.31**	**1.31**

Test Point	Depth of Test (metres)	Soil Moisture - % Volume Water Content (% VWC)			Average % VWC
		Reading 1	Reading 2	Reading 3	
WTT1	0	0.0	0.0	0.0	0.0
WTT2	0.2	38.6	38.9	39.7	39.1
WTT3	0.2	5.6	5.5	5.8	5.6
WTT4	0	4.9	4.7	4.7	4.8
WTT5	0.3	45.6	45.9	46.0	45.8
WTT6	0	0.0	0.0	0.0	0.0
	0.2	5.9	5.8	6.1	5.9
WTT7	0.4	44.9	45.2	45.3	45.1
	0.8	44.9	45.6	45.5	45.3
WTT8	0	4.6	4.9	4.7	4.7
	0.2	5.3	5.8	5.1	5.4
WTT9	0.4	40.8	41.1	41.3	41.1
	0.8	44.2	43.9	44.4	44.2
WTT10	0	10.3	9.9	9.7	10.0
WTT11	0	10.6	10.4	10.6	10.5
TT1	0	4.1	4.2	4.0	4.1
	0.2	9.3	9.2	9.0	9.2
				Site Average	**18.9**

DRAIG GEOSCIENCE PTY LTD

SONEL S.A.
Testing and Calibration Laboratory
Wokulskiego 11
58-100 ŚWIDNICA
phone: +48 74 85 838 00, e-mail: laboratorium@sonel.pl

CALIBRATION CERTIFICATE

Date of issue: 08 January 2020 **Certificate No:** 209210/20

OBJECT OF CALIBRATION	Earth resistance meter type: MRU-120HD, serial No: EM0030, manufacturer: SONEL S.A.
APPLICANT	SONEL S.A. Wokulskiego 11, 58-100 Świdnica
CALIBRATION METHOD	According to IW01 "Calibration of digital meters", issue 2.1, date 07.10.2019 - measurement form FP141/IW01/S16 date of issue 06.09.2017.
ENVIRONMENTAL CONDITIONS	Ambient temperature: (21,4 ÷ 22,1) °C Relative humidity: (33,1 ÷ 34,8) %.
DATE OF CALIBRATION	08 January 2020
TRACEABILITY	This certificate provides traceability of measurement results to the International System of Units (SI).
CALIBRATION RESULTS	Results for calibrated object have been presented on pages 2/5 to 5/5 including uncertainty of measurement.
UNCERTAINTY OF MEASUREMENTS	Uncertainty of measurement has been evaluated in compliance with EA-4/02 M:2013. The expanded uncertainty assigned corresponds to a coverage probability of 95 % and the coverage factor k = 2.

SONEL S.A.
Kierownik Techniczny
Laboratorium Badawczo-Wzorcującego
mgr inż. Marek Michalski

This certificate without approval Laboratory shall not be reproduced except in full.

CALIBRATION RESULTS Calibration results are the following:

1. AC 50 Hz voltage.

Range	Reference value of voltage	Measured value of voltage	Measurement error	Measurement uncertainty	Max permiss. error
V	V	V	V	V	V
100,0	24,0	24,0	0,0	0,6	3,5

2. AC resistance (continuity measurement).

Range	Reference value of resistance	Measured value of resistance	Measurement error	Measurement uncertainty	Max. permiss. error
Ω	Ω	Ω	Ω	Ω	Ω
19,99	0,000	0,000	0,000	0,006	0,020
	0,300	0,300	0,000	0,006	0,026
	18,000	17,940	-0,060	0,022	0,380
199,9	180,00	179,60	-0,40	0,12	3,80
1999	1800,0	1796,0	-4,0	1,2	38,0
kΩ	kΩ	kΩ	kΩ	kΩ	kΩ
9,99	9,000	9,120	0,120	0,008	0,470
19,9	18,00	18,00	0,00	0,06	1,10

3. AC resistance (earth resistance)
4P 50 V 50 Hz

Range	Nominal value resistance of aux. electrodes		Reference value of resistance	Measured value of resistance	Meas. error	Meas. uncert.	Max. permiss. error
	RH	RS					
Ω	Ω	Ω	Ω	Ω	Ω	Ω	Ω
19,990	100	100	0,100	0,090	-0,010	0,006	0,022
	100	100	0,500	0,490	-0,010	0,006	0,030
	100	100	18,011	17,940	-0,071	0,022	0,380
199,9	100	100	180,01	179,60	-0,41	0,12	3,80
1999	100	100	1800,0	1797,0	-3,0	1,2	38,0
kΩ	Ω	Ω	kΩ	kΩ	kΩ	kΩ	kΩ
9,99	100	100	9,000	8,880	-0,120	0,008	0,490
19,9	100	100	18,00	18,00	0,00	0,06	1,30

Authorized by:

3. AC resistance (earth resistance) - cont.

4P 25 V 50 Hz

Range	Nominal value resistance of aux. electrodes		Reference value of resistance	Measured value of resistance	Meas. error	Meas. uncert.	Max. permiss. error
	RH	RS					
Ω	Ω	Ω	Ω	Ω	Ω	Ω	Ω
19,99	100	100	0,050	0,040	-0,010	0,006	0,021
	100	100	0,500	0,490	-0,010	0,007	0,030
	100	100	18,01	17,94	-0,07	0,03	0,38
199,9	100	100	180,01	179,70	-0,31	0,12	3,80
Ω	kΩ	kΩ	Ω	Ω	Ω	Ω	Ω
19,99	1	1	0,300	0,290	-0,010	0,006	0,026
1999	1	1	1800,0	1793,0	-7,0	1,2	38,0
19,99	15	15	18,01	18,56	0,55	0,03	2,74
kΩ	kΩ	kΩ	kΩ	kΩ	kΩ	kΩ	kΩ
19,9	15	15	18,00	17,60	-0,40	0,06	2,91

3P 25 V 50 Hz

Range	Nominal value resistance of aux. electrodes		Reference value of resistance	Measured value of resistance	Meas. error	Meas. uncert.	Max. permiss. error
	RH	RS					
Ω	Ω	Ω	Ω	Ω	Ω	Ω	Ω
19,99	100	100	0,088	0,100	0,012	0,006	0,022
	100	100	0,538	0,540	0,002	0,006	0,031
	100	100	18,038	18,000	-0,038	0,022	0,381
199,90	100	100	180,04	179,70	-0,34	0,12	3,80
Ω	kΩ	kΩ	Ω	Ω	Ω	Ω	Ω
19,99	1	1	0,338	0,340	0,002	0,006	0,027
1999	1	1	1800,0	1793,0	-7,0	1,2	38,0
19,99	15	15	18,04	18,41	0,37	0,03	2,75
kΩ	kΩ	kΩ	kΩ	kΩ	kΩ	kΩ	kΩ
19,9	15	15	18,00	17,50	-0,50	0,06	2,91

Authorized by:

4. AC resistance (selective measurement of earthing with clamps)

3P+C 50 V 50 Hz

Range	Nominal value resistance of aux. electrodes		Reference value of resistance	Measured value of resistance	Meas. error	Meas. uncert.	Max. permiss. error
	RH	RS					
Ω	Ω	Ω	Ω	Ω	Ω	Ω	Ω
19,99	100	100	0,088	0,100	0,012	0,006	0,037
	100	100	0,538	0,540	0,002	0,006	0,073
	100	100	18,038	18,020	-0,018	0,022	1,473
199,9	100	100	180,04	179,80	-0,24	0,12	14,70
1999	100	100	1800,0	1801,0	1,0	1,2	147,0

3P+C 25 V 50 Hz

Range	Nominal value resistance of aux. electrodes		Reference value of resistance	Measured value of resistance	Meas. error	Meas. uncert.	Max. permiss. error
	RH	RS					
Ω	Ω	Ω	Ω	Ω	Ω	Ω	Ω
19,99	100	100	0,088	0,100	0,012	0,006	0,037
	100	100	0,538	0,540	0,002	0,006	0,073
	100	100	18,038	18,020	-0,018	0,022	1,473
199,9	100	100	180,04	179,90	-0,14	0,22	14,70
Ω	kΩ	kΩ	Ω	Ω	Ω	Ω	Ω
19,99	1	1	0,538	0,540	0,002	0,006	0,073
1999	1	1	1800,0	1797,0	-3,0	1,2	147,0
19,99	15	15	18,038	18,330	0,292	0,022	3,838
1999	15	15	1800,0	1795,0	-5,0	1,2	309,0

Authorized by: Dawid Robak

5. AC resistance (of auxiliary earth electrodes).

4P 25 V 50 Hz

Range	Nominal value of earth resistance	Reference value of resistance	Measured value of resistance	Meas. error	Meas. uncert.	Max. permiss. error
RH		RH, RS	RH	RH	RH	RH
Ω	Ω	Ω	Ω	Ω	Ω	Ω
999	0,050	100,0	100,0	0,0	0,9	18,0
	180,011	100,0	101,0	1,0	0,9	27,0
kΩ	Ω	kΩ	kΩ	kΩ	kΩ	kΩ
9,99	0,300	1,000	1,000	0,000	0,009	0,180
	1800,01	1,000	1,000	0,000	0,009	0,270
kΩ	Ω	kΩ	kΩ	kΩ	kΩ	kΩ
19,9	18,011	15,00	15,00	0,00	0,11	2,30
	kΩ	kΩ	kΩ	kΩ	kΩ	kΩ
	18,00	15,00	14,50	-0,50	0,11	3,20

4P 25 V 50 Hz

Range	Nominal value of earth resistance	Reference value of resistance	Measured value of resistance	Meas. error	Meas. uncert.	Max. permiss. error
RS		RH, RS	RS	RS	RS	RS
Ω	Ω	Ω	Ω	Ω	Ω	Ω
999	0,050	100,0	100,0	0,0	0,9	18,0
	180,011	100,0	100,0	0,0	0,9	27,0
kΩ	Ω	kΩ	kΩ	kΩ	kΩ	kΩ
9,99	0,300	1,000	1,000	0,000	0,009	0,180
	1800,01	1,000	0,995	-0,005	0,006	0,270
kΩ	Ω	kΩ	kΩ	kΩ	kΩ	kΩ
19,9	18,011	15,00	15,00	0,00	0,11	2,30
	kΩ	kΩ	kΩ	kΩ	kΩ	kΩ
	18,00	15,00	14,70	-0,30	0,11	3,20

6. AC resistance (selective measurement of earthing with double clamps)

50 Hz

Range	Reference value of resistance	Measured value of resistance	Measurement error	Measurement uncertainty	Max. permiss. error
Ω	Ω	Ω	Ω	Ω	Ω
19,99	0,138	0,140	0,002	0,006	0,044
	0,538	0,540	0,002	0,007	0,084
	10,038	9,960	-0,078	0,009	1,034
	18,038	18,190	0,152	0,012	1,834
149,9	120,0	121,5	1,5	0,1	24,3

Authorized by: Dawid Rybka

Hukseflux
Thermal Sensors

Hukseflux Thermal Sensors
URL: www.hukseflux.com
E-mail: info@hukseflux.com
Elektronicaweg 25
2628 XG Delft
The Netherlands

Certificate of calibration

Calibration Reference Cylinder

Type: CRC05
Serial Number: 8032

Calibration Date:	02-06-2008
Thermal conductivity :	0.189 W/mK
Remarks:	
Performed by:	K.K. van den Berg

Thermal conductivity standards identification: PR44/E03070427A and PR44/E03070427B, calibration data 24 October 2003, NPL certificate PR44/E03070427.

Environmental conditions:

Normal indoor conditions; temperature between 18 and 25 degrees C, humidity between 30 and 70%

Uncertainty:

The overall uncertainty in the thermal conductivity is estimated to be within ± 3%, with a confidence level of 95%.

Hukseflux
Thermal Sensors

Hukseflux Thermal Sensors B.V.
www.hukseflux.com
info@hukseflux.com

Product certificate

Pages: 1
Release date: 24 MAR, 2020

Product code	**TP09**
Product identification	**serial number 558**
Product type	thermal needle
Measurand	thermal conductivity

Calibration result

Electrical resistance / meter	**R_e = 85.42 Ω/m**
Calibration uncertainty	**± 0.85 Ω/m**
	the number following the ± symbol is the expanded uncertainty with a coverage factor k = 2, and defines an interval estimated to have a level of confidence of 95 percent

Product specifications

1:	functional check	**verified**

Measurement process

Metrological characteristic	R_e in [Ω/m]: sensitivity to electrical resistance
Calibration method	Hukseflux TNC
Uncertainty of the method	the expanded uncertainty is ± 1 %

Metrological traceability

Calibration traceability	traceability of calibration is to the SI units of m and the derived SI unit of Ω
Calibration hierarchy	from SI through international standards

Evaluation of the uncertainty of the calibration result

Uncertainty calculation	based on nominal values and rectangular distribution, k = 2 [GUM]

Table 0.1 *connections*

PIN	NEEDLE	
4	Yellow	heater [+]
2	Yellow	heater [−]
1	Red	signal measure [−]
8	Red	signal current [−]
7	White	signal measure [+]
3	White	signal current [+]

Calibration performed by:
H.E. Brouwer

Date:
24 MAR, 2020

Person authorising acceptance and release of product:
M. Rietveld

Date:
24 MAR, 2020

MAE	CERTIFICATO DI COLLAUDO/TARATURA CALIBRATION CERTIFICATE	CE

business name and address of the manufacturer ragione sociale e indirizzo completo del fabbricante	M.A.E. molisana apparecchiature elettroniche srl
Address Indirizzo	Zona industriale Fresilia 86095 Frosolone (IS) - Italy

Herewith declares that the machine
Dichiara che la macchina

Model ***Modello***	TCR24
Serial Number ***Matricola***	S/N: M20CTP0011
Description ***Descrizione***	A5000T soil thermal conductivity meter equipmentto whom this certificate refers, is in compliance with the following requirements: Thermal conductivity: 0,189W/mK
Day of test ***Data di prova***	15/06/2020

Che a seguito delle verifiche e delle misurazioni effettuate nel rispetto della procedura interna PO02,ev.0 mediante l'ausilio dello strumento oscilloscopio AGILENT MSO-X3024A matricola MY51250104 fornito di adeguato certificato di Taratura LAT 101 B638_2018_ACCR_EO del 20/11/2018, l'apparecchiatura risulta collaudata con esito positivo

Through measures performed according to the internal procedure PO02 rev. 0, by using the oscilloscope AGILENT MSO-X3024A S/N: MY51250104 provided with the proper LAT 101 B638_2018_ACCR_EO dated 20/11/2018, the following instrument has been calibrated with positive results

Data of certificate Data del certificato	15/06/2020
Number of certificate Protocollo del certificato	6296
Operator Operatore	D'Itri Donato

Technical director person authorized to compile the technical file
Direttore tecnico e persona autorizzata alla produzione del fascicolo tecnico

signature
firma

Molisana Apparecchiature Elettroniche srl
Cav. Domenico Mainella

Appendix D
Laboratory Result Charts

APPENDIX D – CONTENTS

Particle Size Distribution Chart, All Sample

Particle Size Distribution Chart, Grouped by Geological Unit

Plasticity Chart

Rock Strength Charts **9 Pages**

Table D-1 – Laboratory Test Results

Test Pit	Depth (m)	Particle Size Distribution			Moisture Content (%)	Atterberg Limits			CBR (%)	Emerson Class
		Gravel (%)	Sand (%)	Fines (%)		LL (%)	PI (%)	LS (%)		
TP02	0.3 – 0.5	43	38	19	5.9	23	8	3.0		
TP04	0.7–0.85	38	19	19		24	9	3.0		4
TP11	0.5 – 1.0	65	21	14	9.7					
TP18	1.6 – 1.8	39	46	15	17.5					
TP19	0.8 – 0.9	67	22	11	3.8	25	9	4.0		
TP21	0.5 – 0.8	61	46	15	5.8	24	10	3.5	25	
TP22	0.9 – 1.1	54	32	14	6.2	24	9	3.5		
TP23	1.7 – 1.8	77	11	12	15.9	33	16	5.5		
TP35	0.9 – 1.1	42	33	25	19.9	33	14	6.5		
TP36	1.0 – 1.1	40	30	30	5.4	27	13	7.0		
TP39	1.3 – 1.5	60	27	13	19.7	29	12	4.5		
TP40	0.5 – 1.0	67	27	6	5.6				50	
TP42	2.0 – 2.2	43	38	19	13.9				15	
TP43	0.8 – 1.0								70	
TP46	2.1 – 2.3	37	24	39	5.6	26	12	4.5		
TP49	0.8 – 1.0	65	21	14					60	
TP52	1.0 – 1.1	63	24	13	4.2	31	15	5.5		
TP53	1.3 – 1.5	51	29	20	8.7					
BH01	2.3 – 2.5	73	22	5		53	21	5.0		
BH11	0.5 – 1.0	30	56	14		35	19	7.0		
BH25	1.5 – 1.95	69	12	19		40	18	6.5		
BH25	4.0 – 4.2	70	12	18		38	17	6.5		

Table D-2 – Laboratory Test Results - Rock

BH	Depth (m)	UCS (MPa)	UCS Mode	Is50 (MPa)	Is - Type	Is Mode	AS 1726 Cat.
BH01	5.1 – 5.2			0.16	D	C	L
BH01	5.6 – 5.7			0.86	A	S	M
BH01	7.1 – 7.2			0.74	D	D	M
BH01	8.5 – 8.8	66.3	Sh	6.1	A	S	VH
BH01	8.9 – 9.0			5.9	D	S	VH
BH01	9.4 – 9.55			2	D	D	H
BH01	9.55 – 9.8	82.5	Sh / V				VH
BH01	10.35 – 10.5			5.1	D	S	VH
BH01	10.9 – 11.0			0.68	A	D	M
BH01	11.45 – 11.6			0.29	A	D	L-M
BH02	5.2 – 5.7	92.8	Sh	2.3	D	D	VH / H
BH02	7.0 – 7.1			>8.5	D	N	VH-EH
BH02	8.5 – 8.8	164	Sh	>8.5	D	N	VH
BH02	10.9 – 11.0			8.2	D	D	VH
BH05	3.75 – 4.0			>7.0	A	N	VH-EH
BH05	5.2 – 5.2			1.4	D	D	H
BH05	5.3 – 5.6	79.8	M				
BH05	7.9 – 8.0			1.9	A	D	H
BH05	8.9 – 9.0			2.5	A	S	H
BH05	9.5 – 9.65			>6.9	A	N	VH-EH
BH05	10.1 – 10.5	81.5	M	>6.9	A	N	VH-EH
BH05B	7.5 – 7.7			>6.7	A	N	VH-EH
BH05B	8.2 – 8.4			>6.9	A	N	VH-EH
BH05B	9.1 – 9.3			>6.9	A	N	VH-EH
BH05B	11.0 – 11.6			>7.1	A	N	VH-EH
BH06	3.7 – 3.8			>8.5	D	N	VH-EH
BH06	4.2 – 4.3			>8.5	D	N	VH-EH
BH06	4.8 – 5.0	104	Sh				VH
BH06	6.3 – 6.5			7.8	D	S	VH
BH06	8.0 – 8.2			6.3	D	S	VH
BH06	8.35 – 8.55	11.1	D				M
BH06	9.4 – 9.6			9.3	D	S	VH
BH06	11.8 – 11.9			4.7	D	S	VH
BH07	4.1 – 4.2			11	D	S	EH
BH07	5.2 – 5.3			10	D	N	VH-EH
BH07	5.3 – 5.6	103	M				VH
BH07	7.4 – 7.5			10	D	N	VH-EH
BH07	8.7 – 9.0	48.8	Sh	5.2	D	D	VH
BH07	10.0 – 10.2			3.8	D	N	VH
BH09	3.2 – 3.55	16.3	D	3.6	D	D	VH
BH09	5.1 – 5.2			4.2	D	D	VH
BH09	6.45 – 6.6			1.7	D	D	H

BH	Depth (m)	UCS (MPa)	UCS Mode	Is50 (MPa)	Is - Type	Is Mode	AS 1726 Cat.
BH09	7.9 – 8.0			6.1	D	S	VH
BH09	9.25 – 9.7			5.8	D	S	VH
BH09	11.5 – 11.65			>11	D	N	EH
BH11	0.5 – 1.0			0.05	D	S	VL
BH11	6.0 – 6.1			3.3	D	D	VH
BH11	8.3 – 8.4			>10	D	N	EH
BH11	11.2 – 11.4	27.3	D				H
BH11	11.6 – 11.7			4.0	D	D	VH
BH12	7.85 – 8.0			>11	D	N	EH
BH12	8.3 – 8.6	198	T	>9.5	D	N	EH
BH12	9.6 – 10.0			>11	D	N	EH
BH12	10.8 – 11.0			>11	D	N	EH
BH18	1.75 – 1.85			>8.5	D	N	VH-EH
BH18	3.0 – 3.4	184	M	>11	D	N	EH
BH18	4.7 – 4.85			>9.7	D	N	EH
BH18	6.15 – 6.3	141	T	>10	D	N	VH / EH
BH22	3.7 – 4.0	251	T	9.9	D	C	EH
BH22	4.55 – 4.7			10	D	S	VH-EH
BH22	6.0 – 6.5	142		>11	D	N	VH / EH
BH22	9.5 – 10.0	201	T	>11	D	N	EH
BH25	6.8 – 6.9			0.021	D	S	EL
BH25	8.8 – 8.9			0.043	D	C	VL
BH25	11.2 – 11.3			1.5	D	S	H
BH27	2.5 – 2.8	8.46	D	0.42	D	C	M
BH27	4.5 – 4.6			0.036	D	S	VL
BH27	5.1 – 5.2			0.13	D	S	L
BH27	8.9 – 9.0			0.099	D	D	VL-L
BH27	9.5 – 9.6			0.29	D	C	L-M
BH27	11.1 – 11.2			2.3	D	S	H
BHNEW2	7.61- 7.78			11	D	S	EH
BHNEW2	7.61- 7.78			6.7	D	S	VH
BHNEW2	7.61- 7.78			10.2	A	S	EH
BHNEW2	8.6 – 8.75			1.0	D	S	M/H
BHNEW2	8.6 – 8.75			3.3	A	S	VH
BHNEW2	11.44 - 11.65			0.7	D	S?	M
BHNEW2	11.44 – 11.65			3.0	A	S	H / VH
BHNEW2	10.65 – 10.93	48.1	D				H
BHNEW3	3.42 – 3.63	319	E				EH
BHNEW3	7.5 – 7.69			11.3	D	S	EH
BHNEW3	7.5 – 7.69			8.5	A	S	VH
BHNEW3	9.21 – 9.33			12.7	A	S	EH
BHNEW3	11.1 – 11.26			11.9	D	S	EH

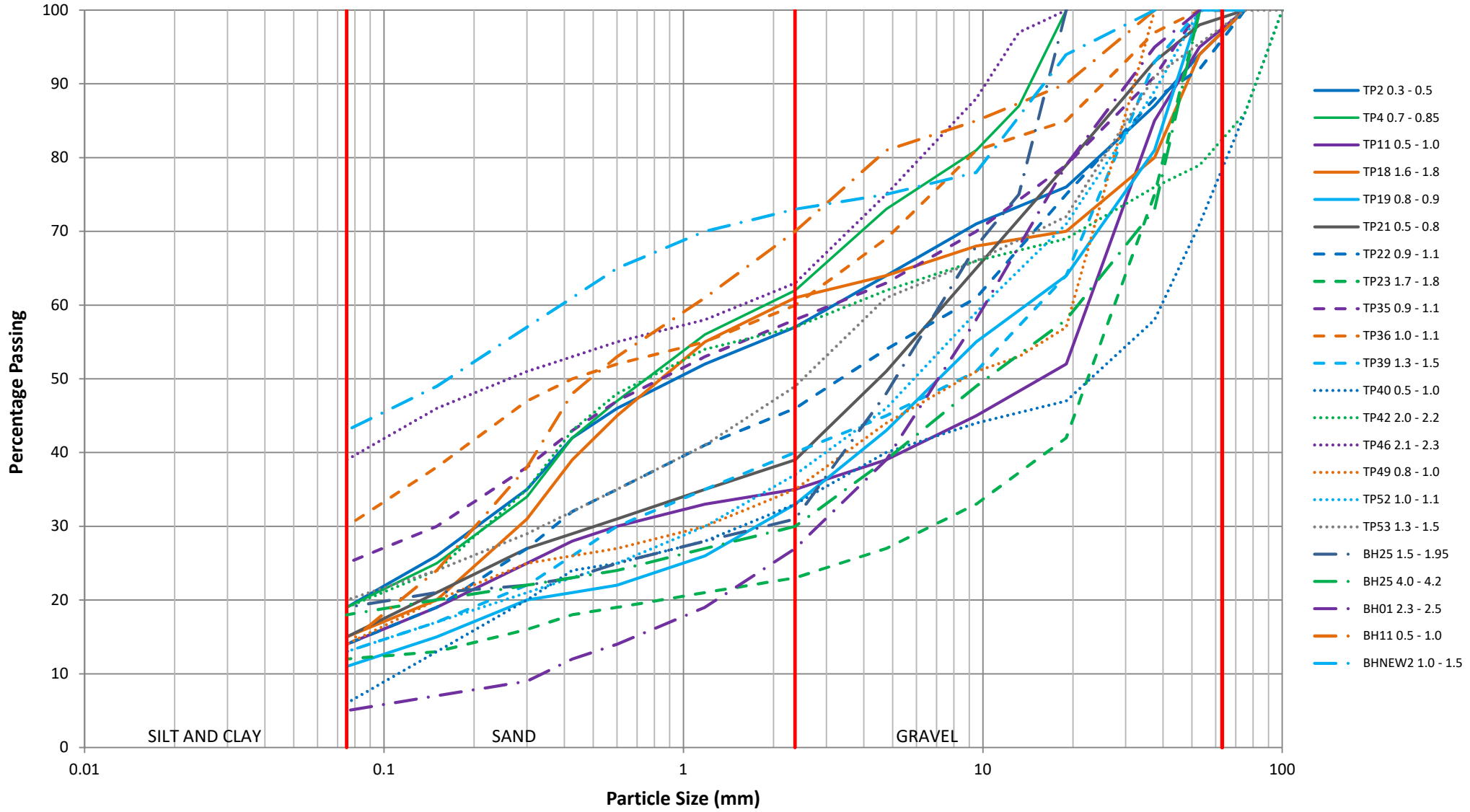
Notes on Table -

Strength Categories: VL – Very Low, L – Low, M – Medium, H – High, VH – Very High, EH – Extremely High

UCS Modes – Sh – Shear, D – Defect, E – Exploded, V- Vertical, M – Mixed, T- Tensile

Is Type – A – Axial, D - Diametral

Is Modes – S – Substance, D – Defect, C – Chip or side break, N – Did not break under applied load



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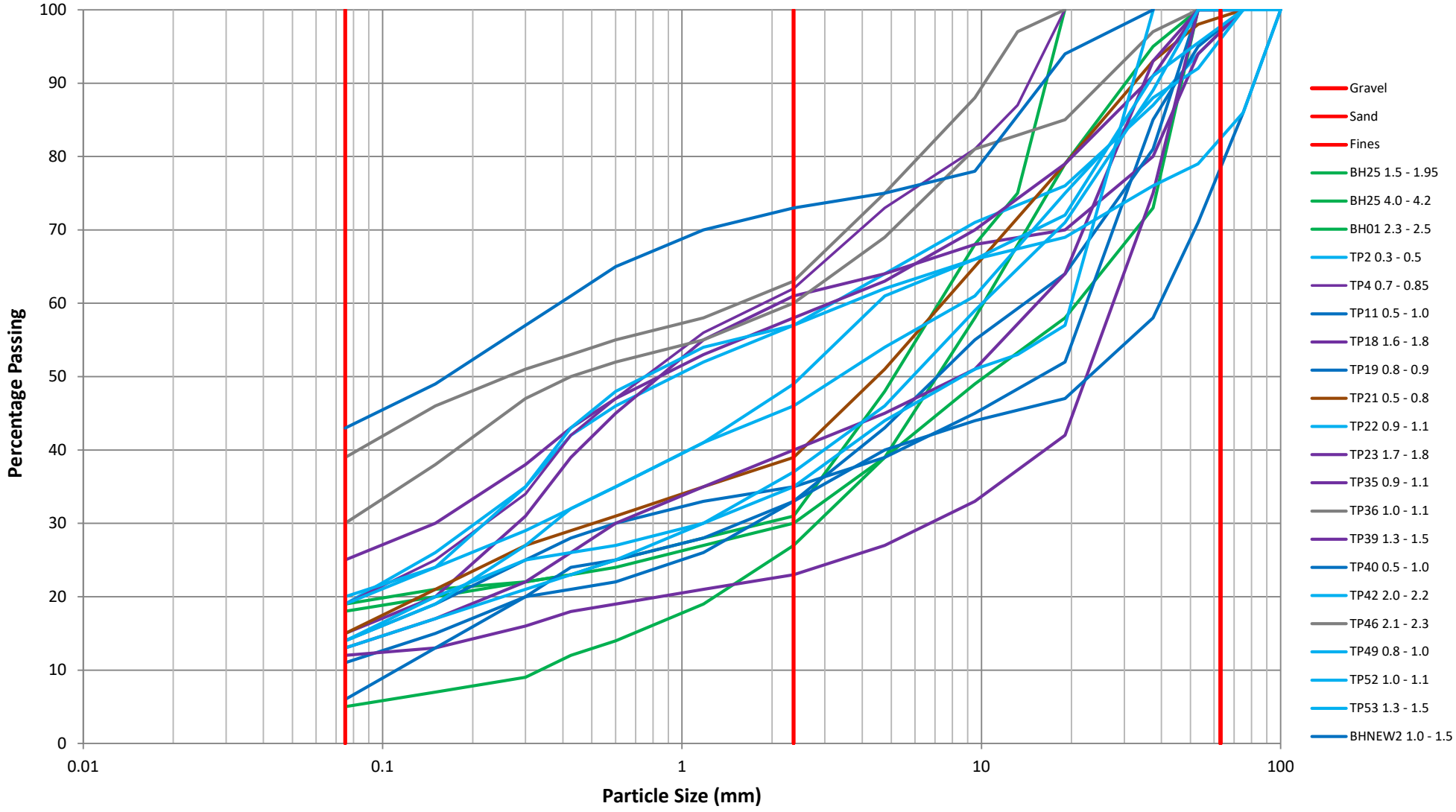

Tidal Sand
Lower Colluvium
Upper Colluvium
Calcrete Gravel
Fill
Weathered Dolerite

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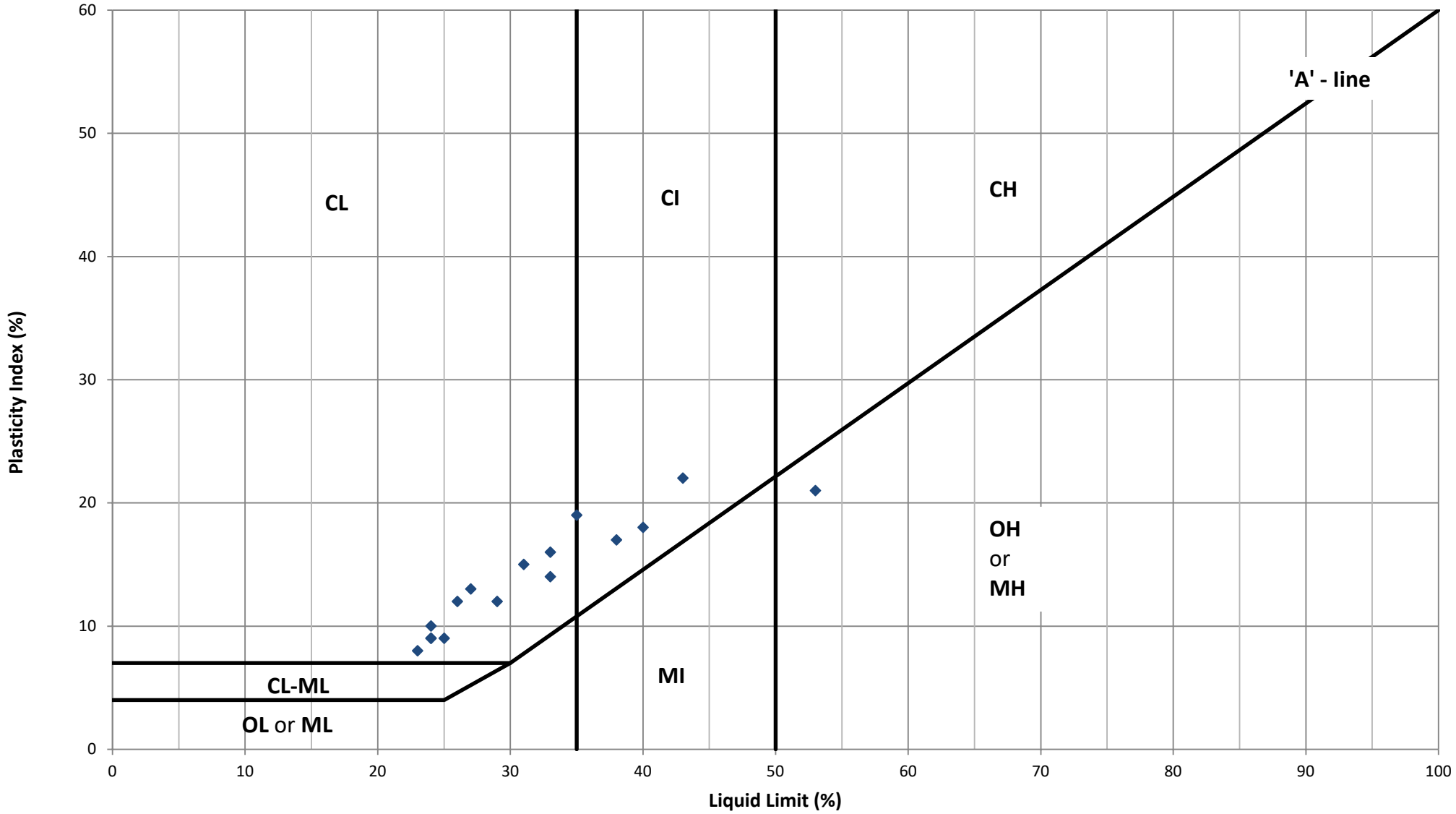

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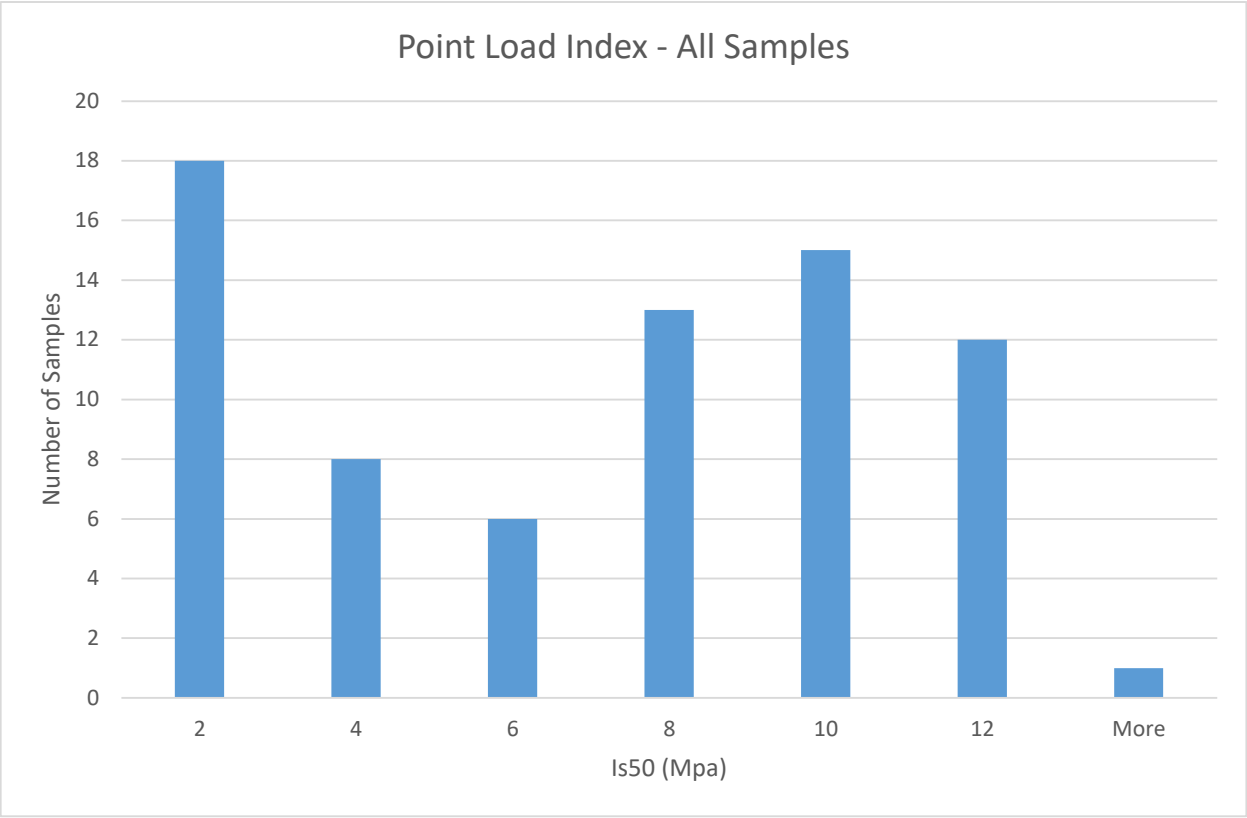

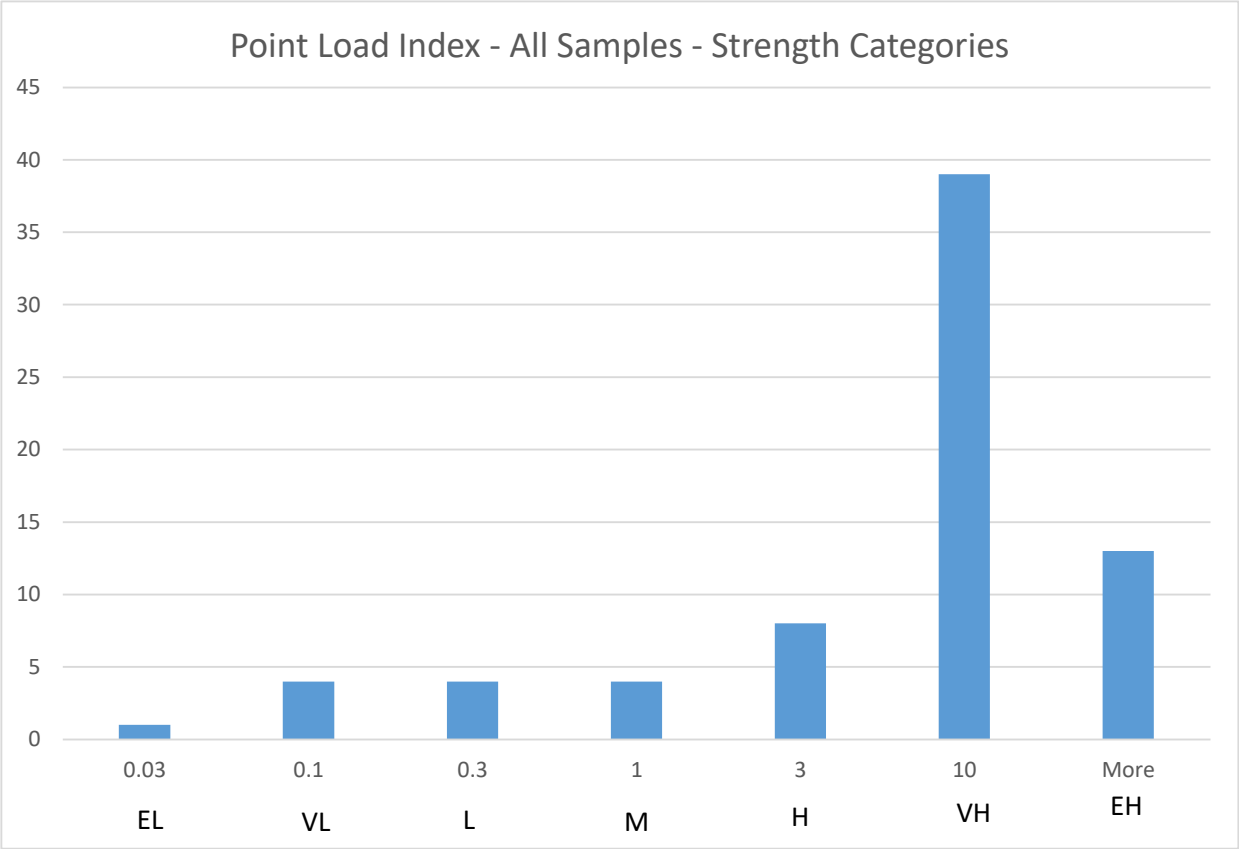

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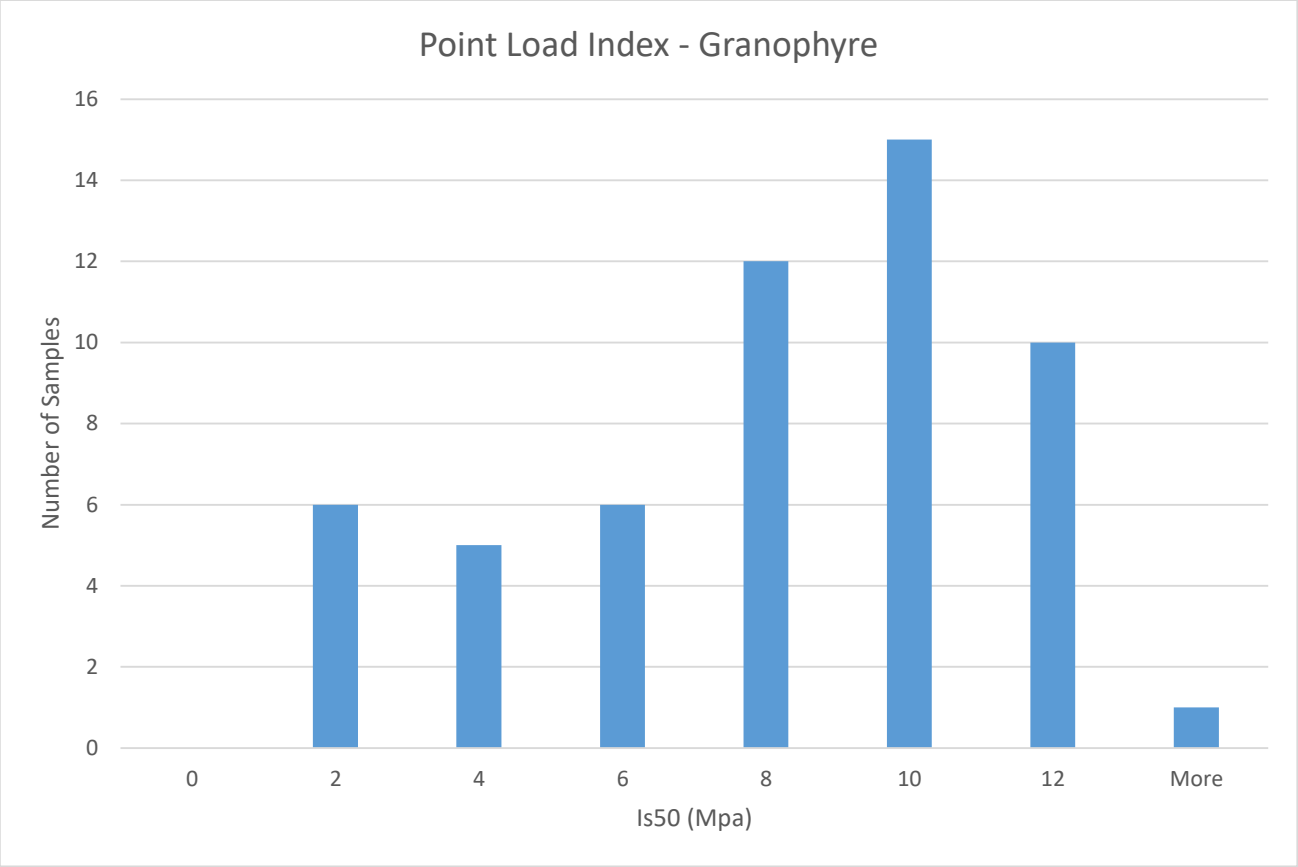

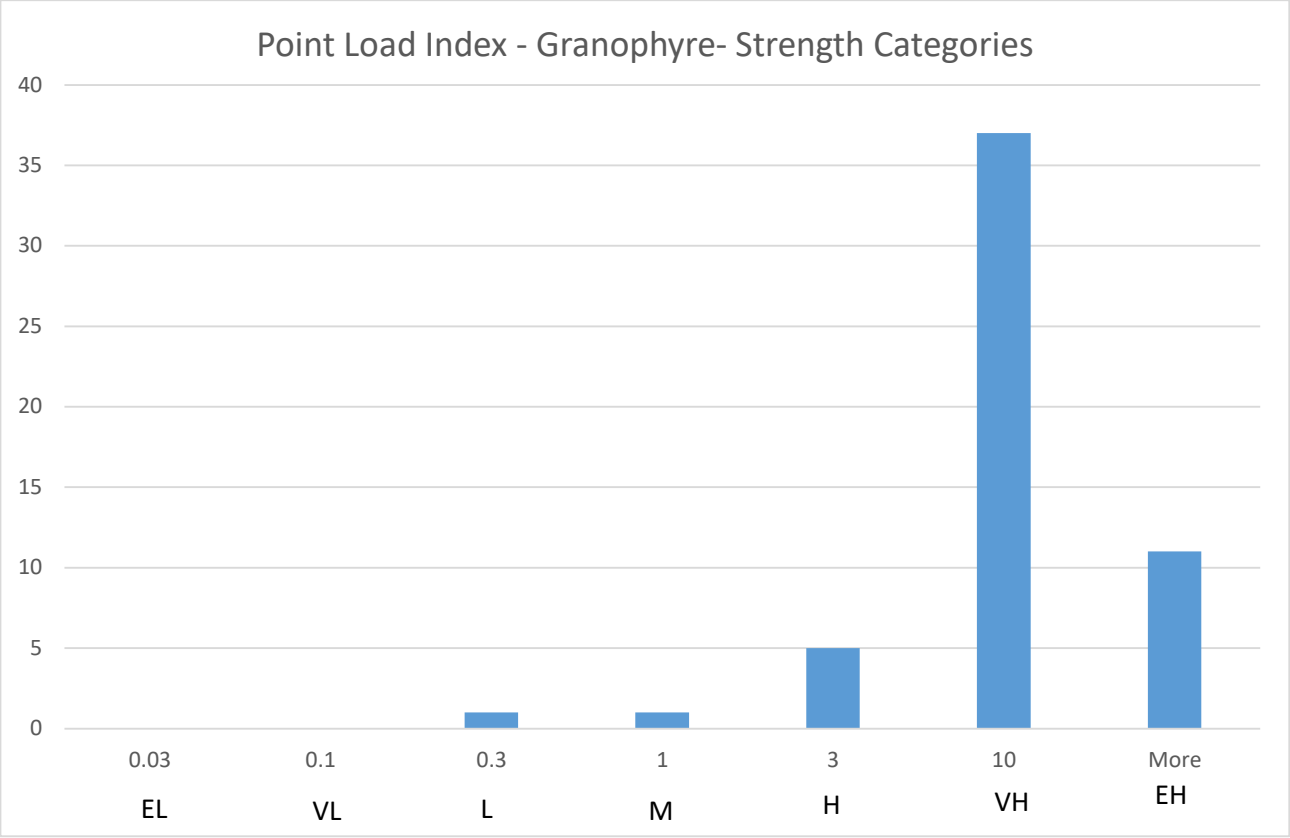

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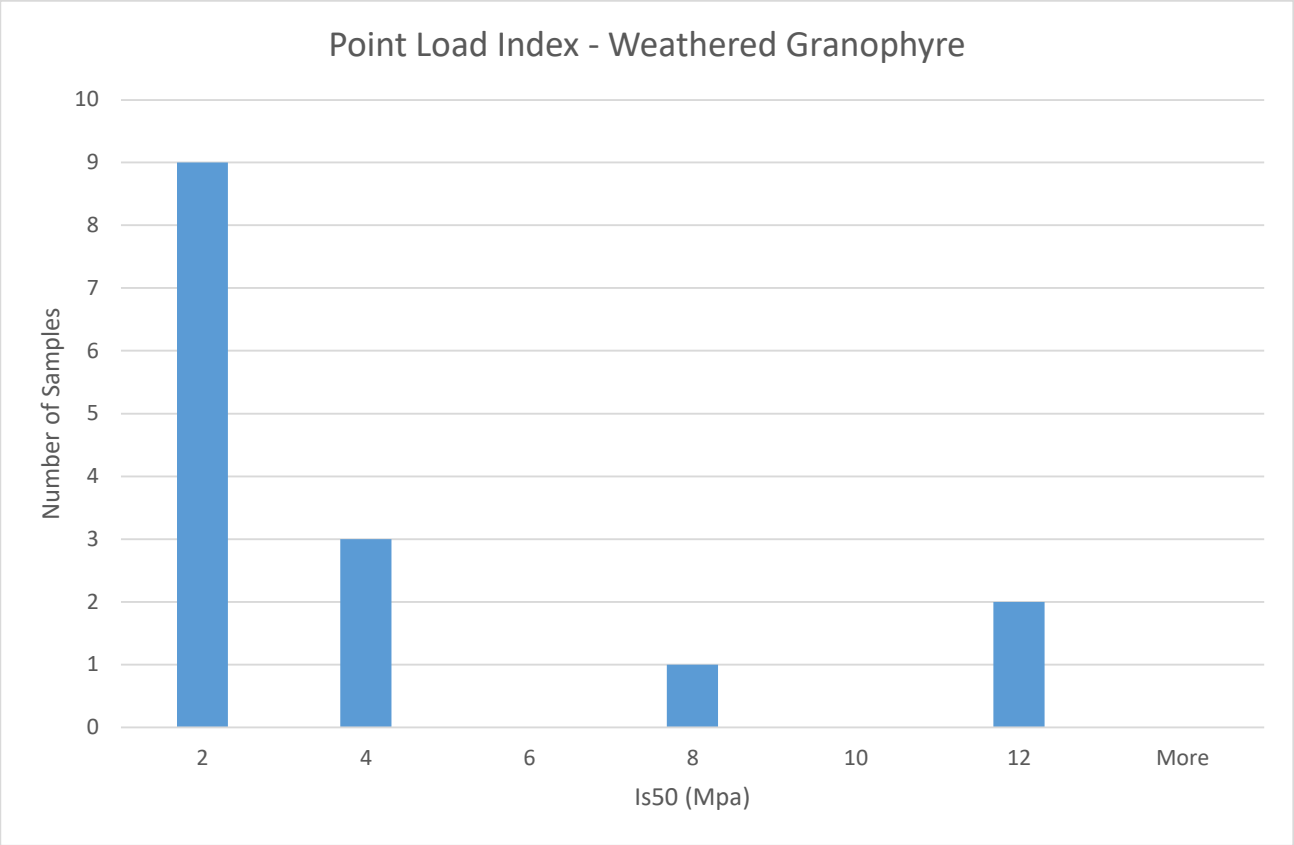

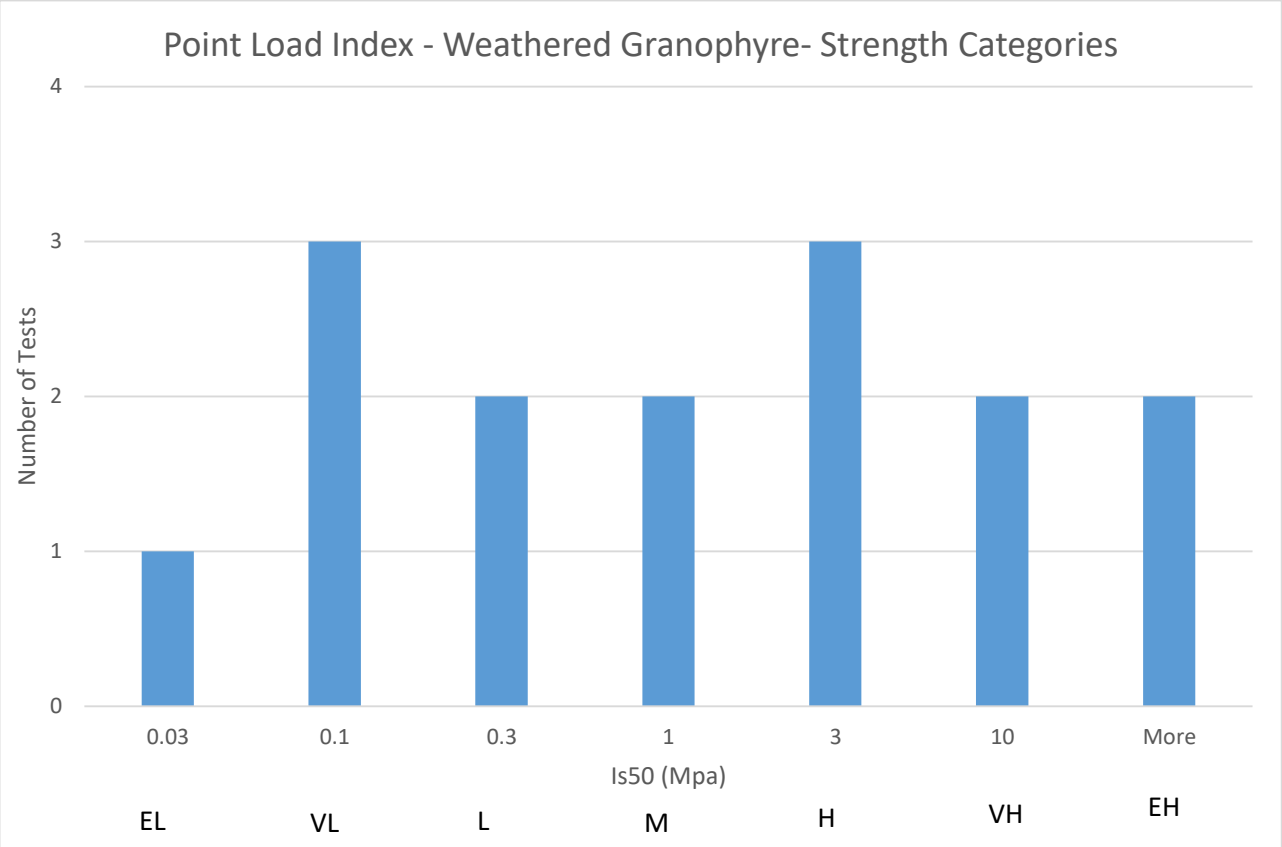

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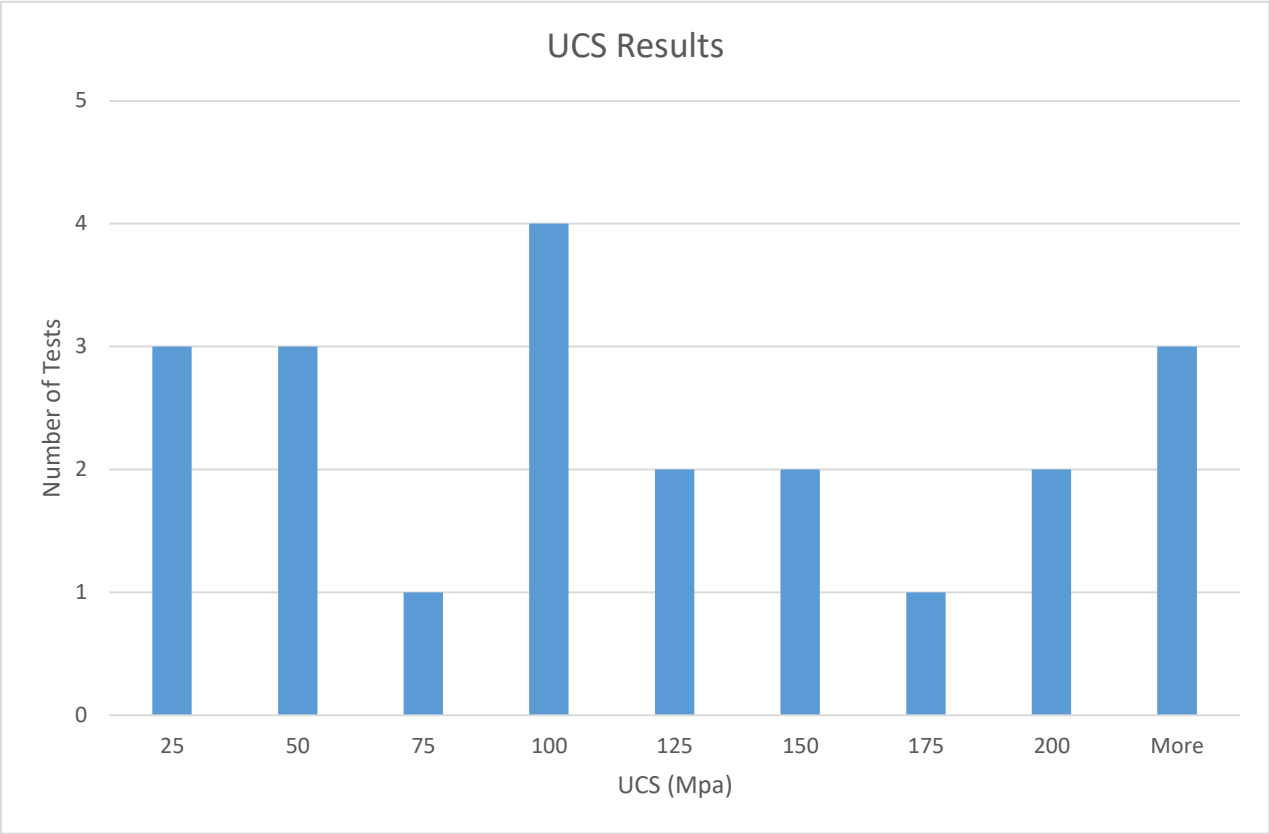

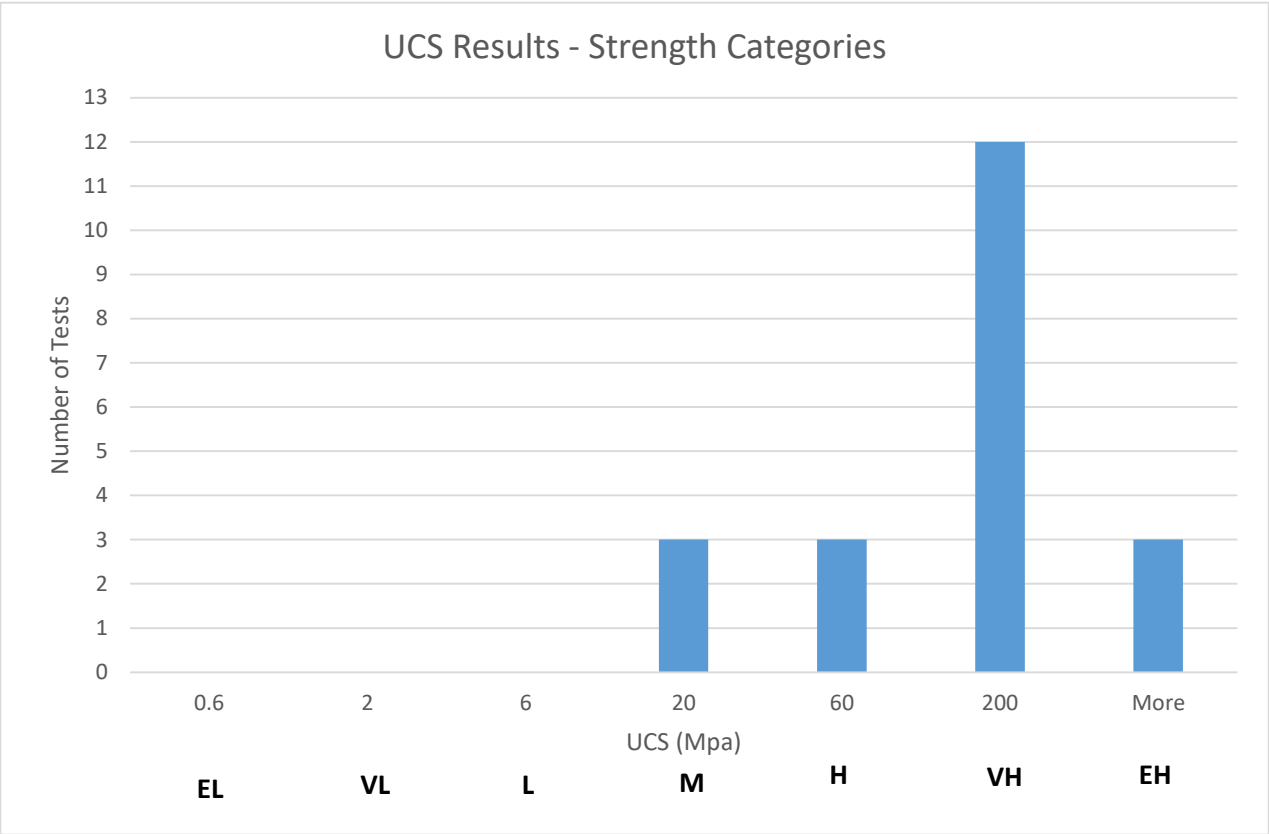

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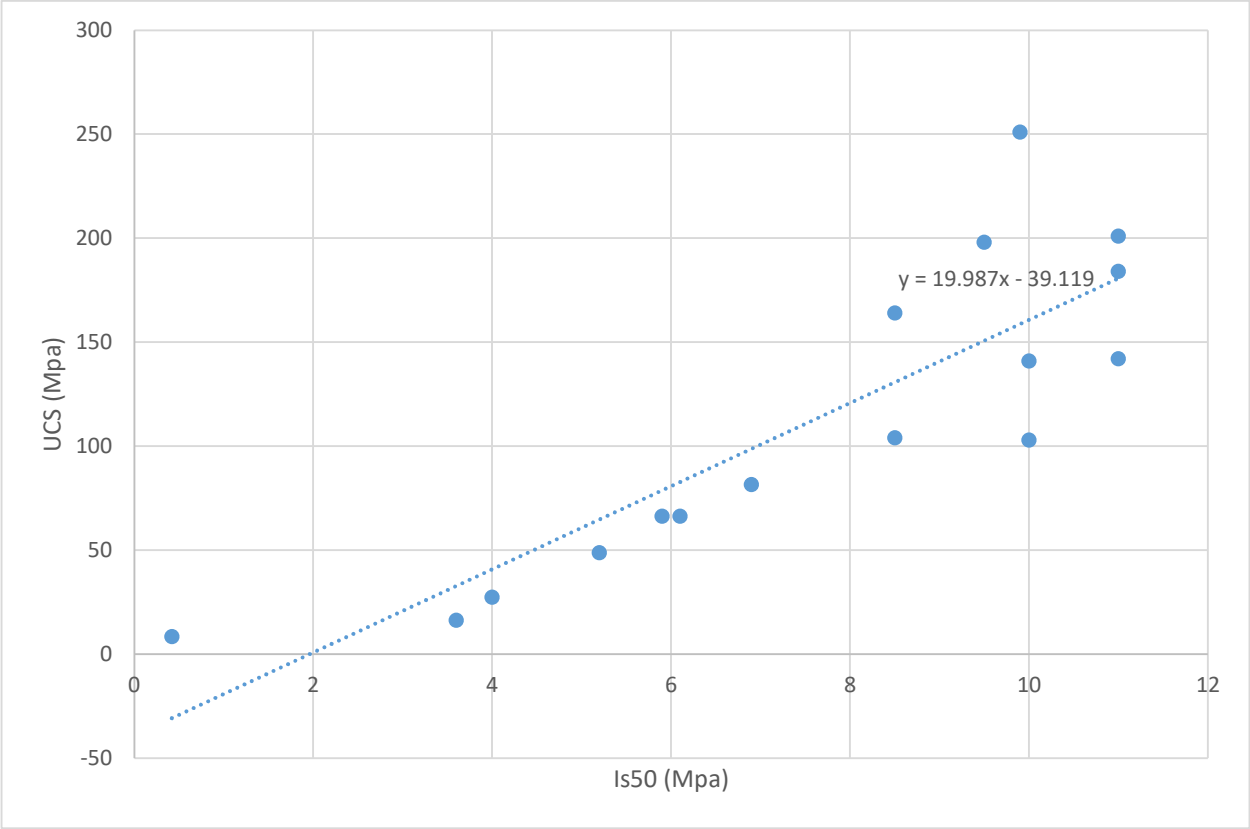

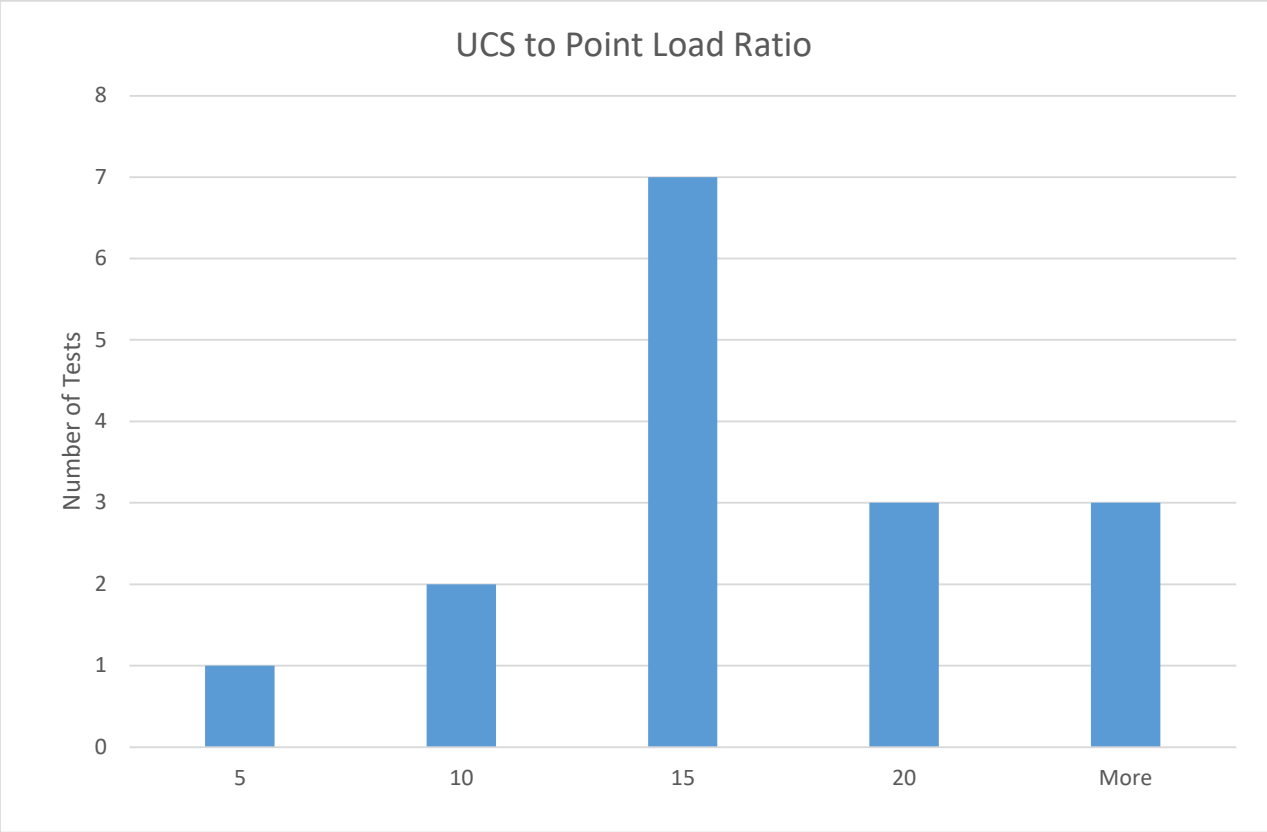

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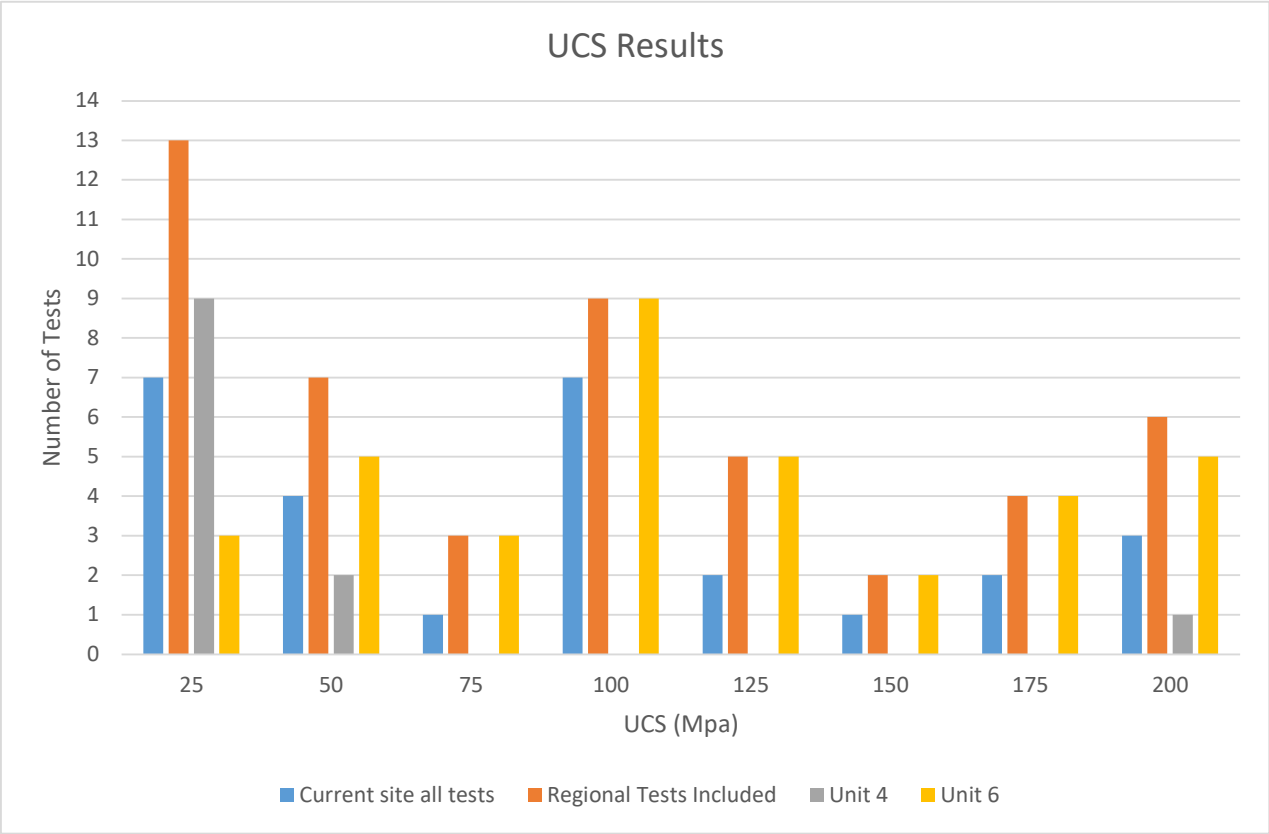

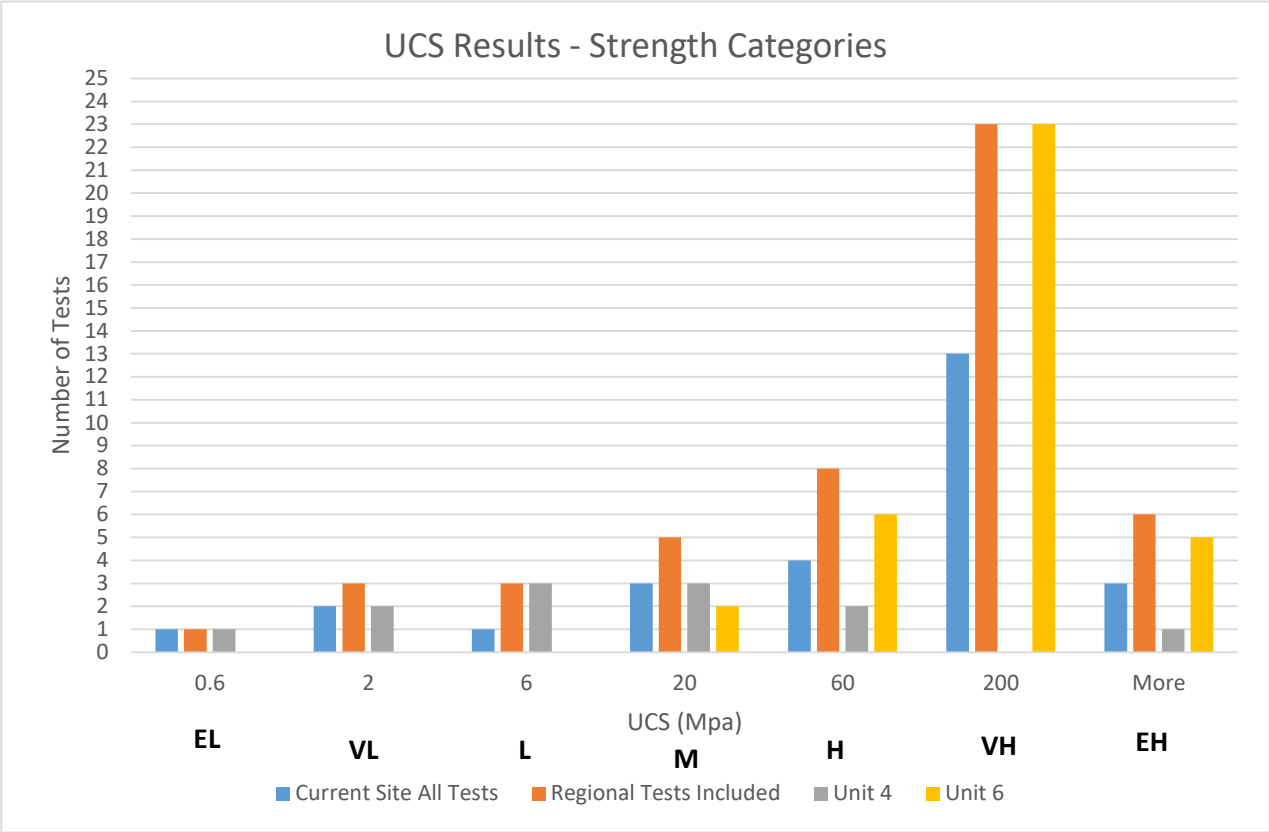

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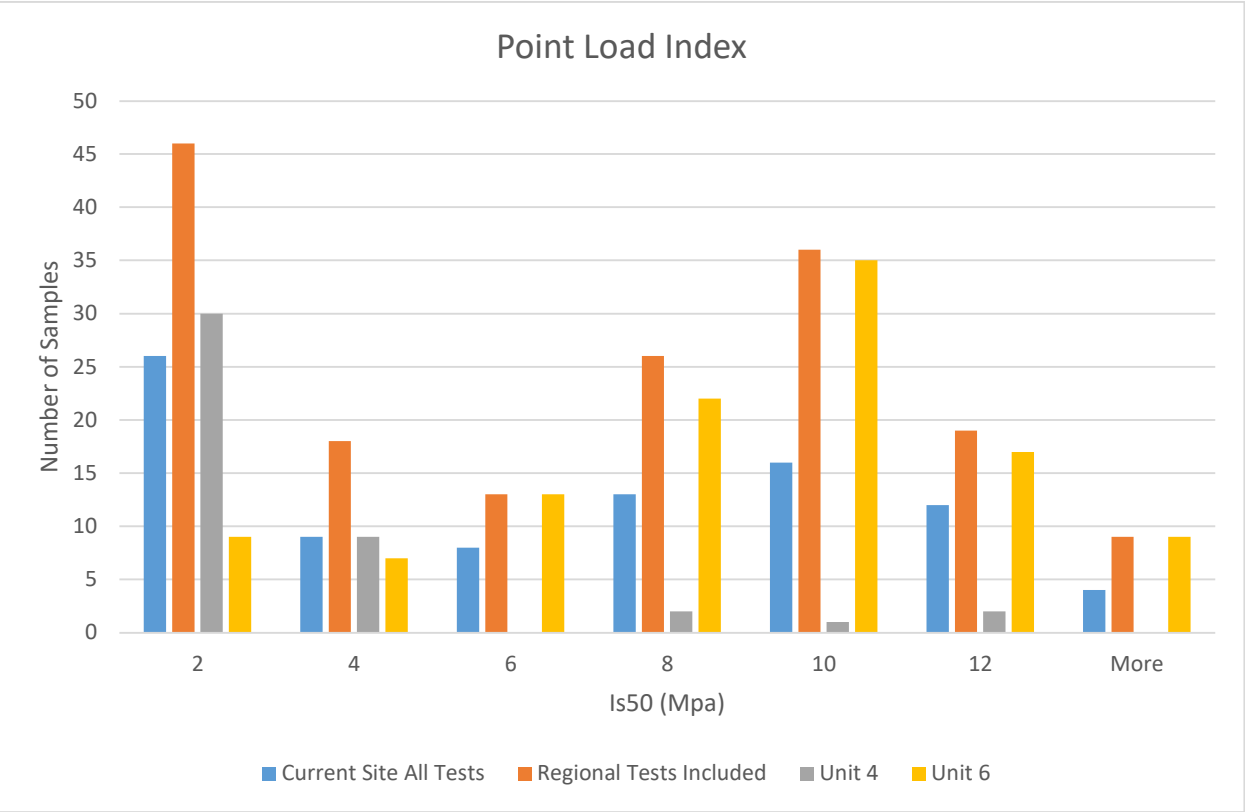

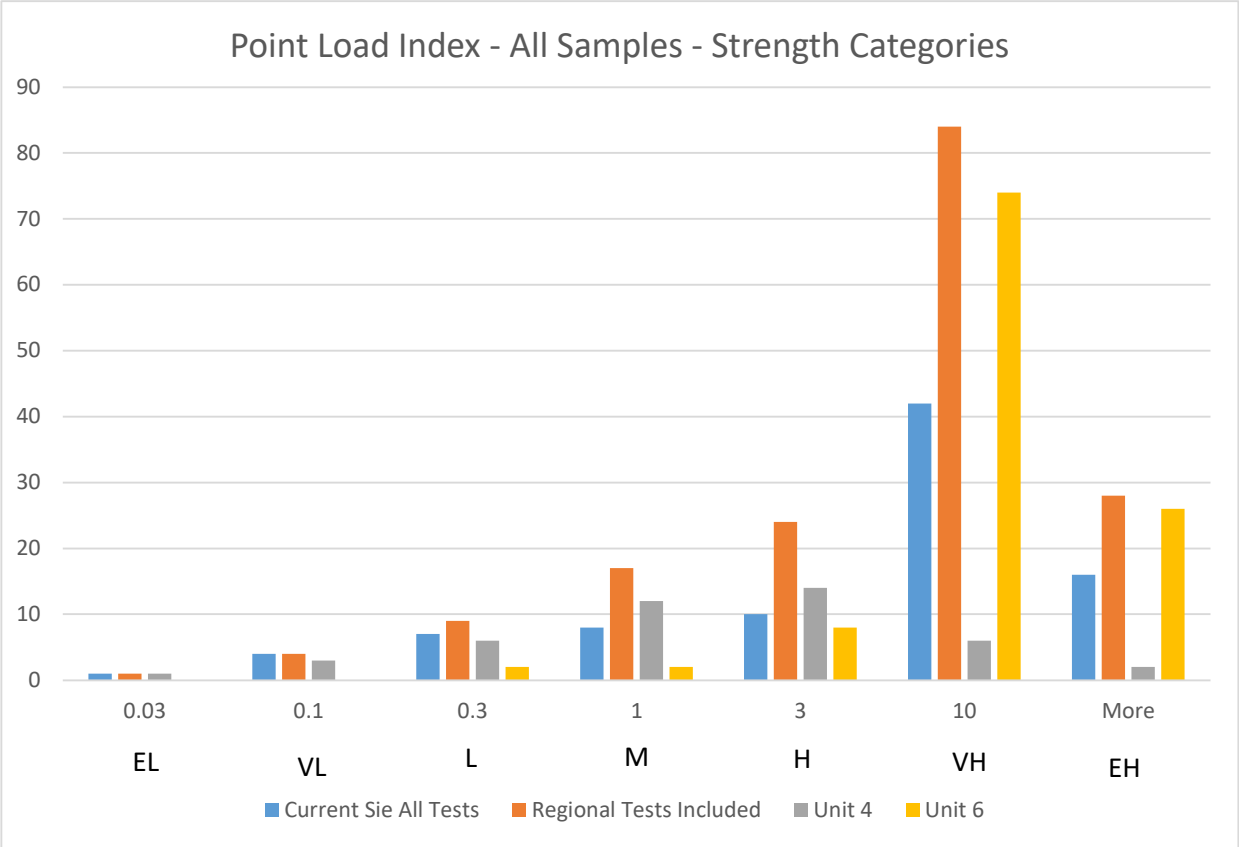

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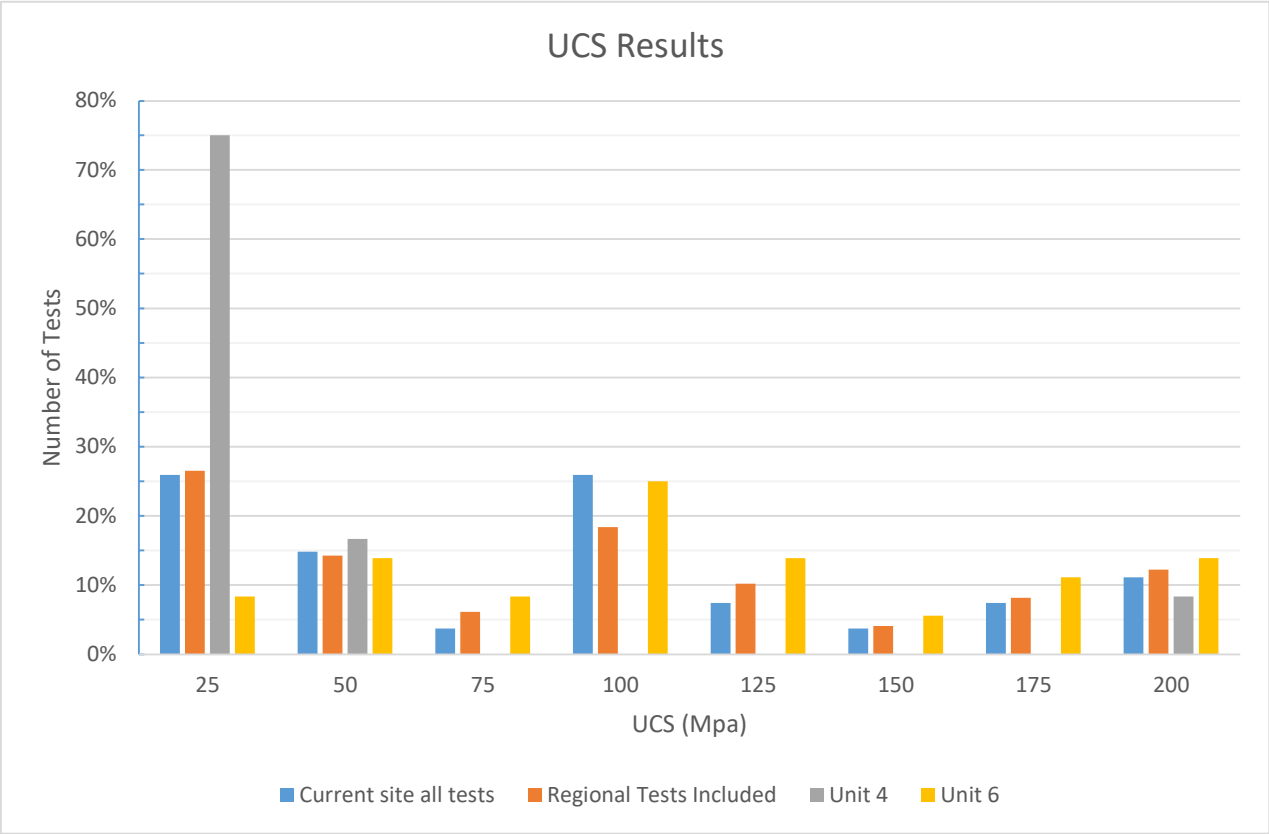

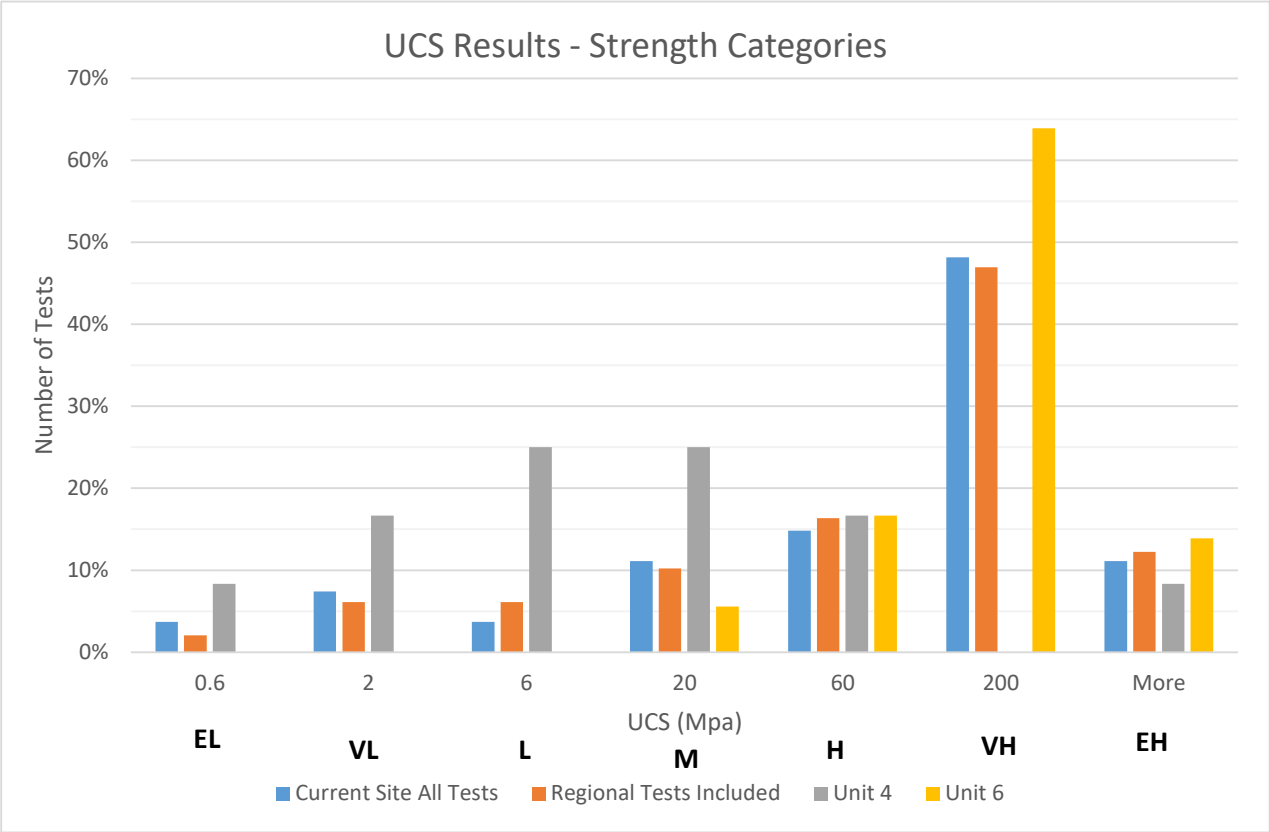

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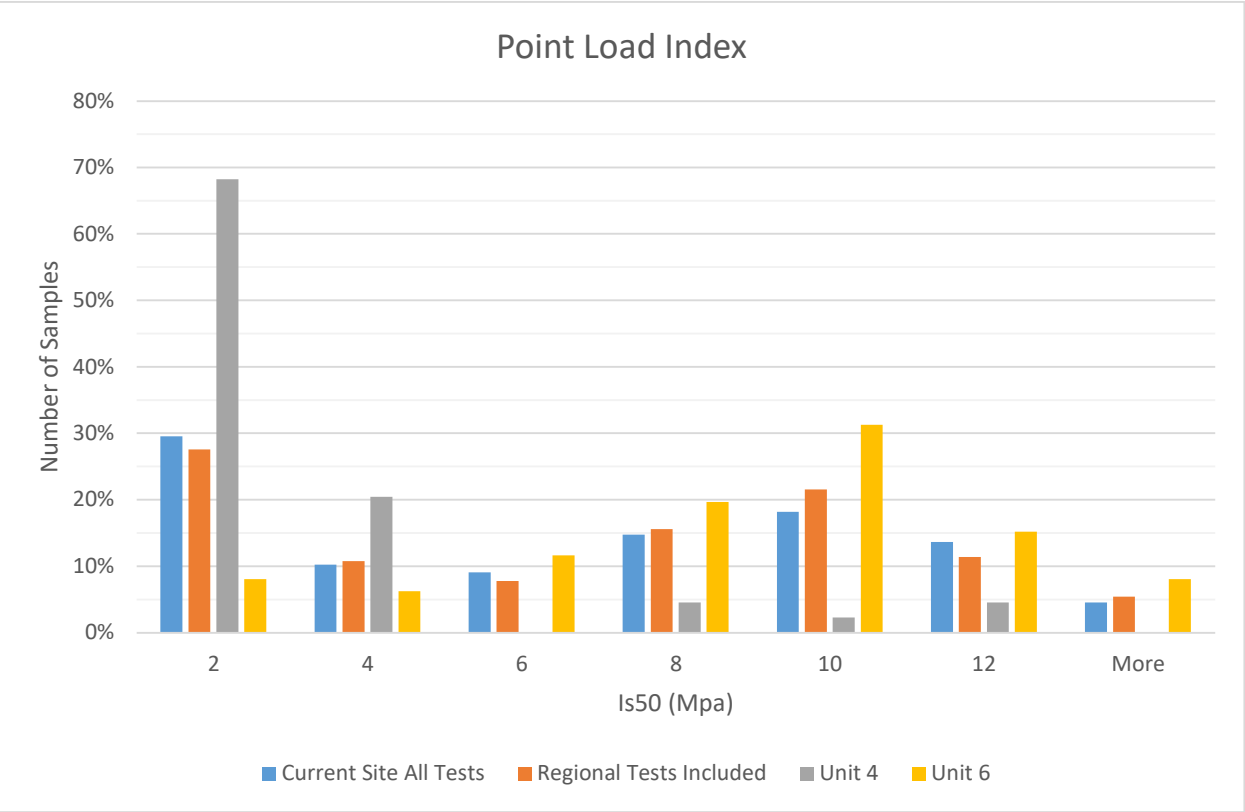

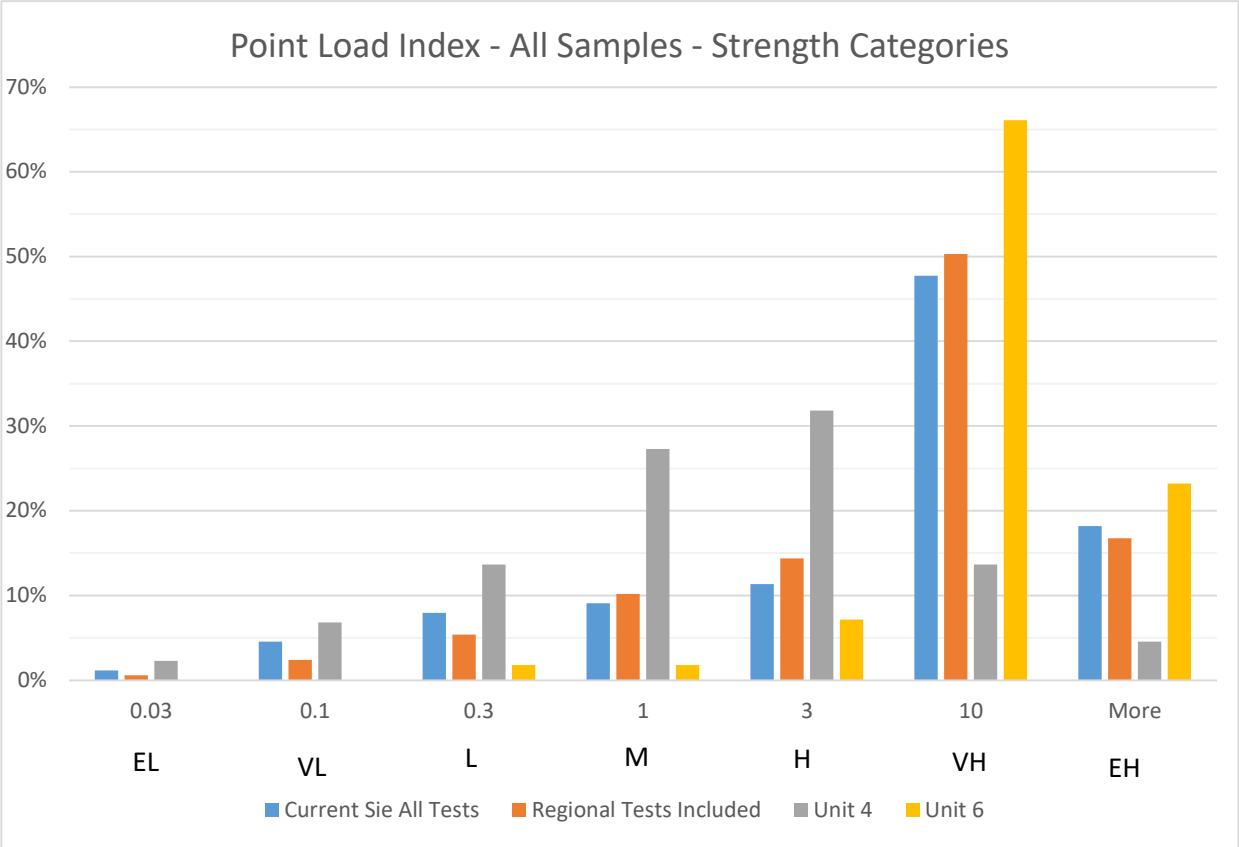

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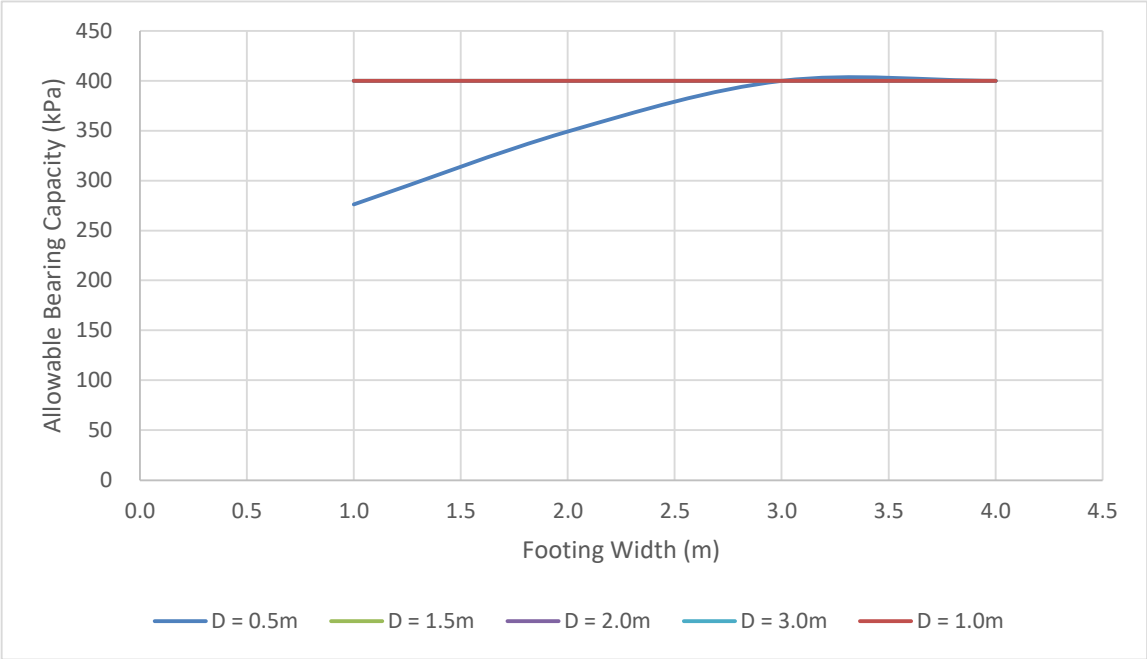
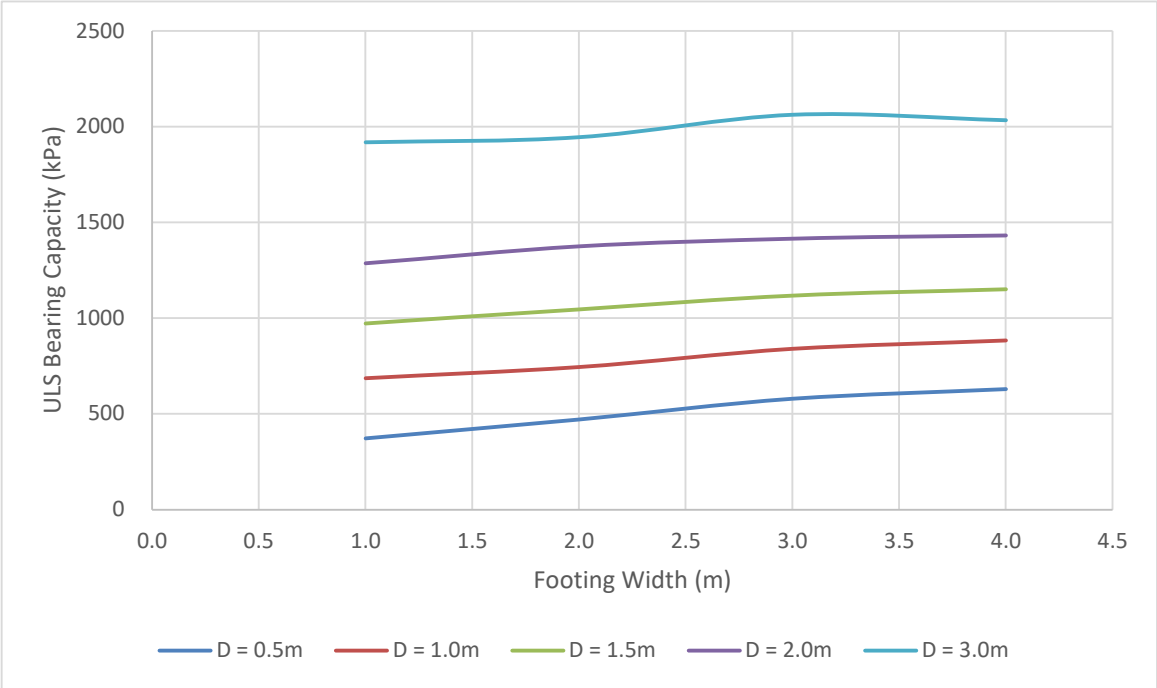
Figure	D12			

Appendix E
Shallow Foundation Charts

APPENDIX E – CONTENTS

Bearing Capacity for Gravel	**2 Pages**
Bearing Capacity for Tidal Sand	**2 Pages**
Bearing Capacity for Site F Existing Fill	**2 Pages**
Bearing Capacity for Sand Banks	**2 Pages**





Colluvial Gravel or Structural Fill

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	title:	Bearing Capacity - Pad Footings
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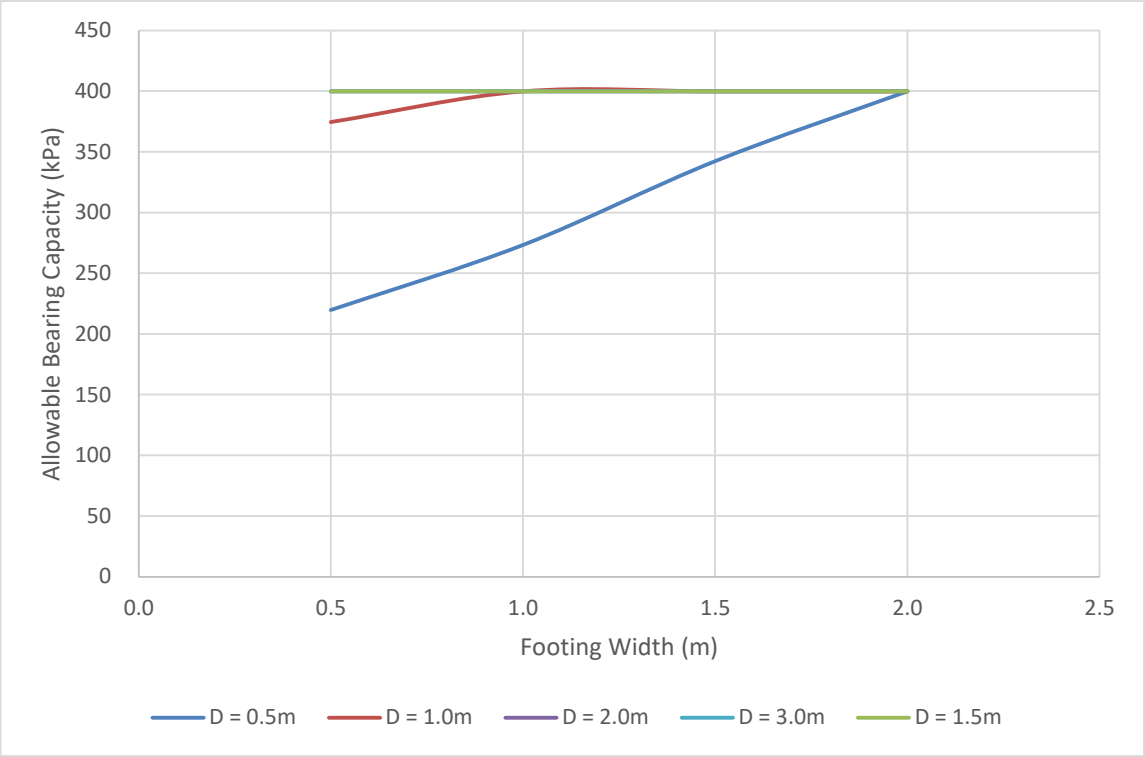
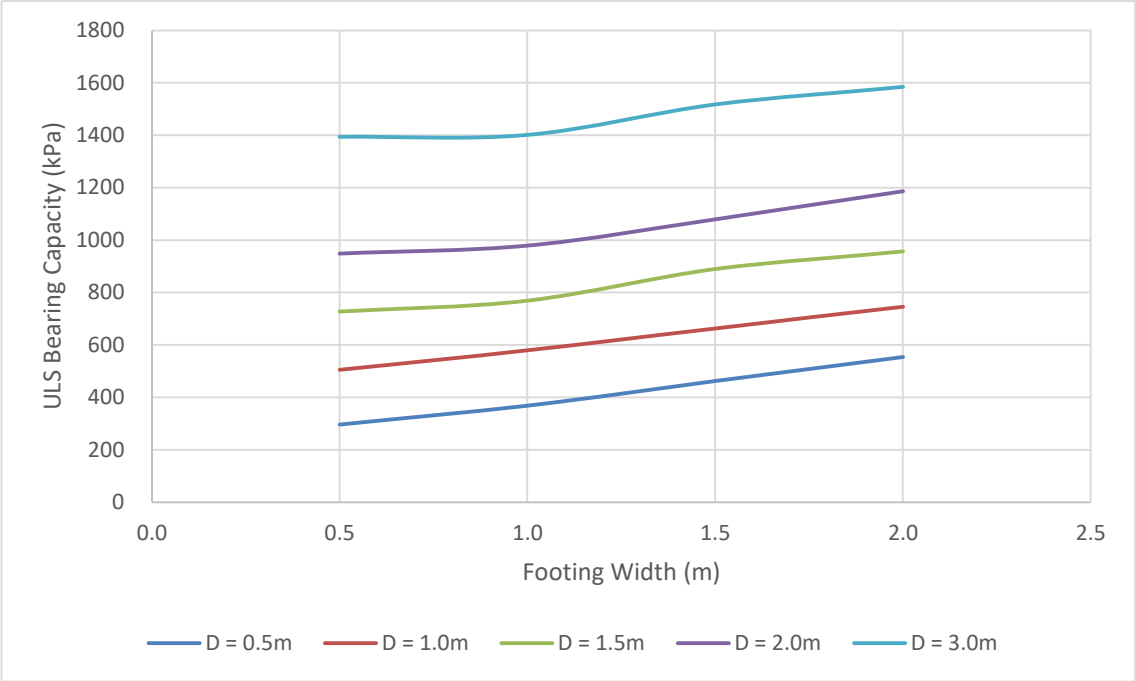
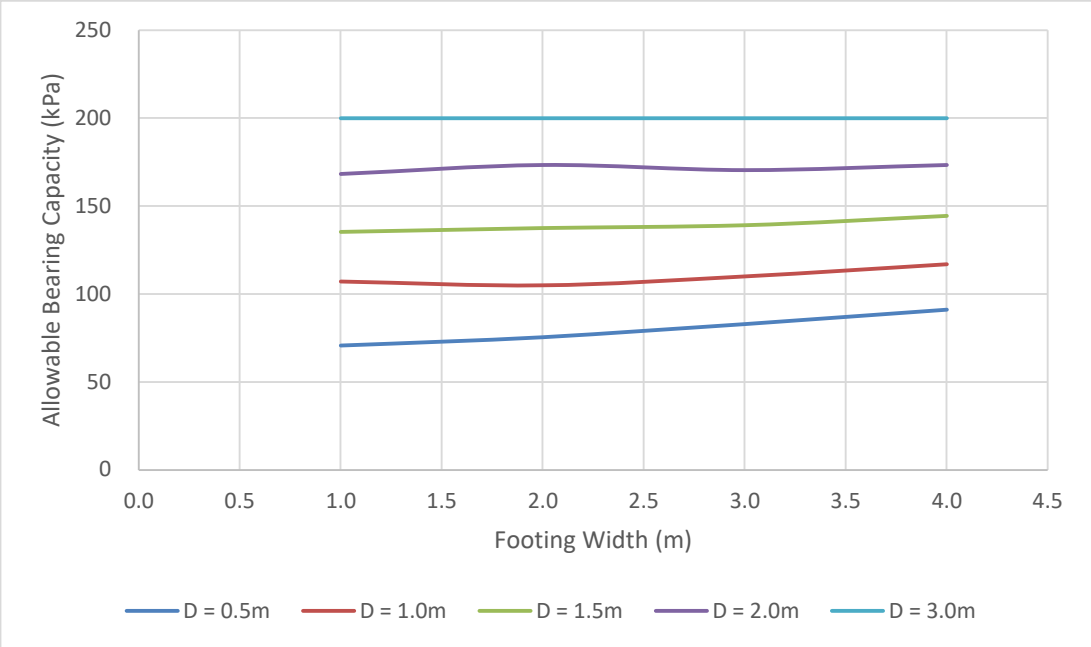
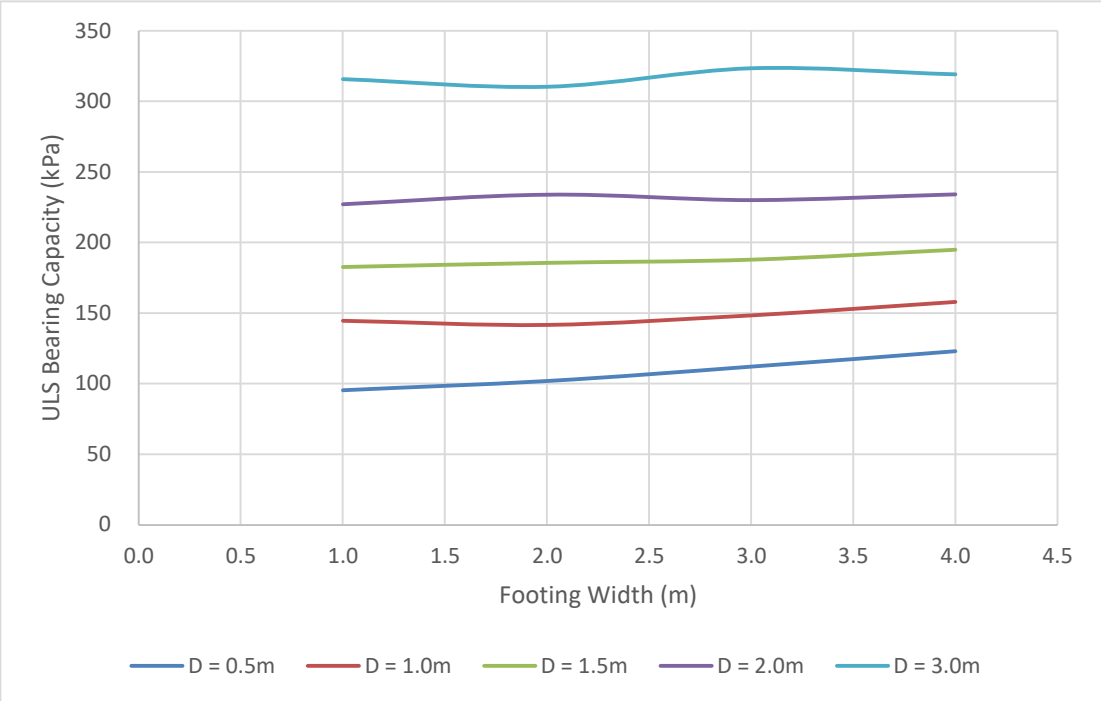




Colluvial Gravel or Structural Fill

client:	**Clough**
project:	**Perdaman Urea Geotechnical Investigation**
title:	**Bearing Capacity - Strip Footings**
job no:	**754-PERGE271567**





Tidal Area Sand

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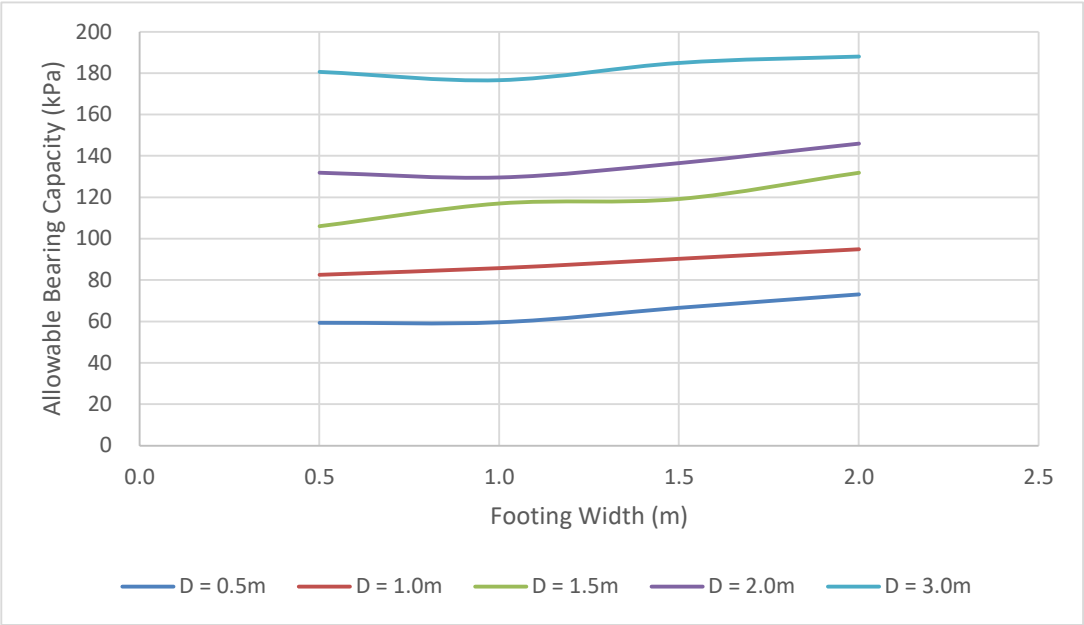
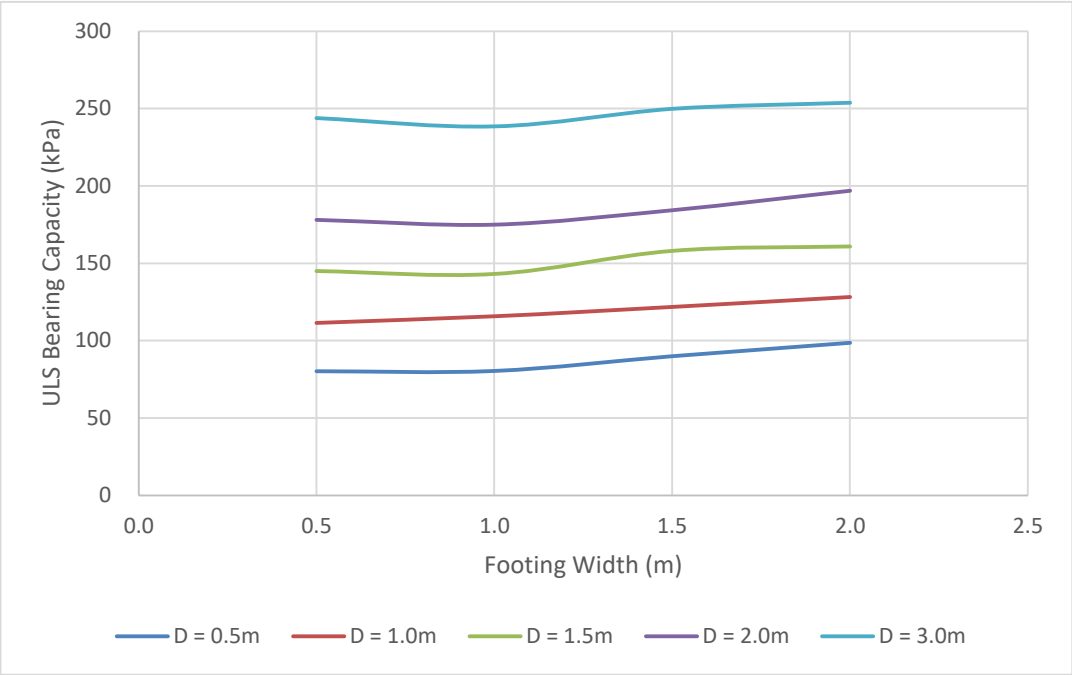
title:	**Bearing Capacity - Pad Footings**
job no:	**754-PERGE271567**





Tidal Area Sand

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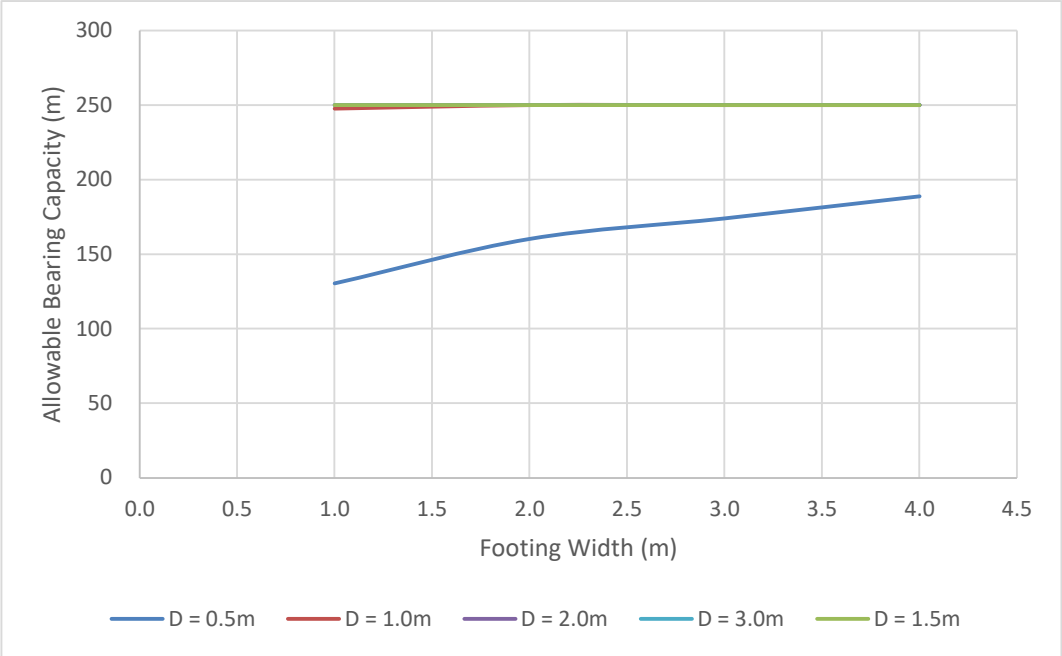
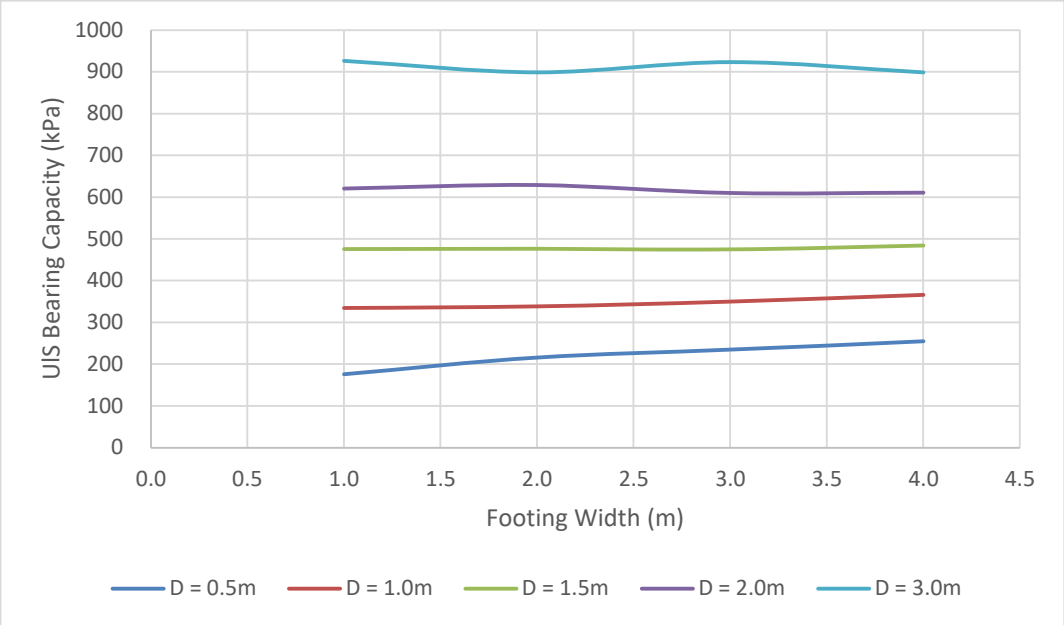
project:	**Perdaman Urea Geotechnical Investigation**
title:	**Bearing Capacity - Strip Footings**
job no:	**754-PERGE271567**





Site F Existing Fill

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project:	**Perdaman Urea Geotechnical Investigation**
title:	**Bearing Capacity - Pad Footings**
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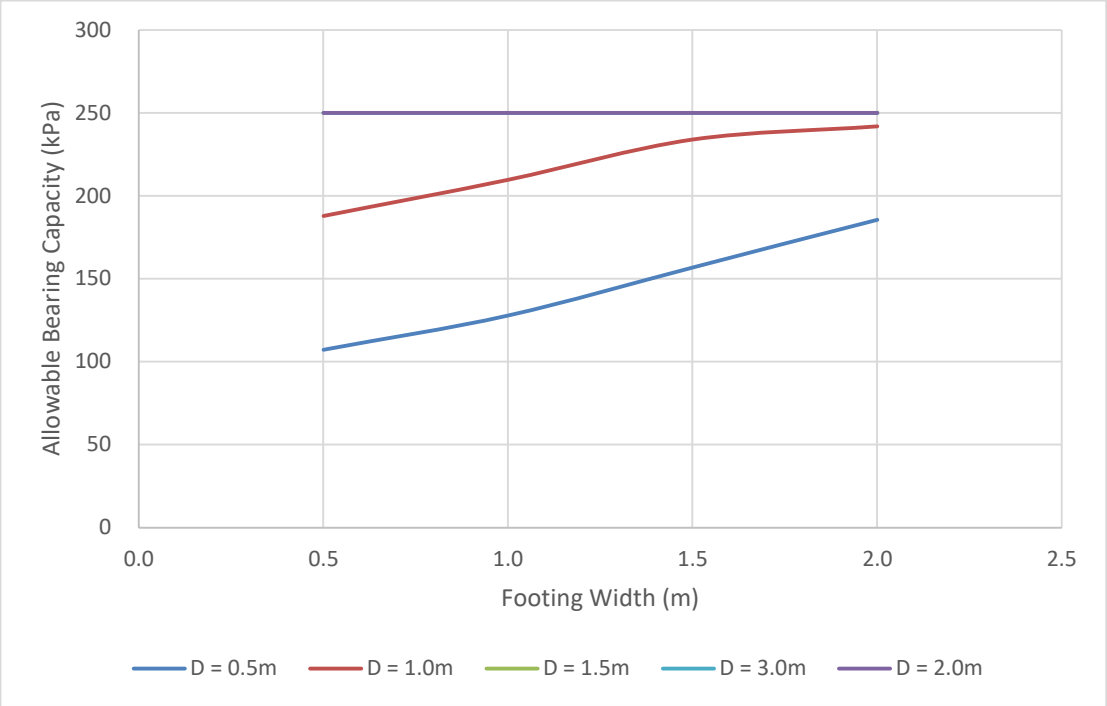

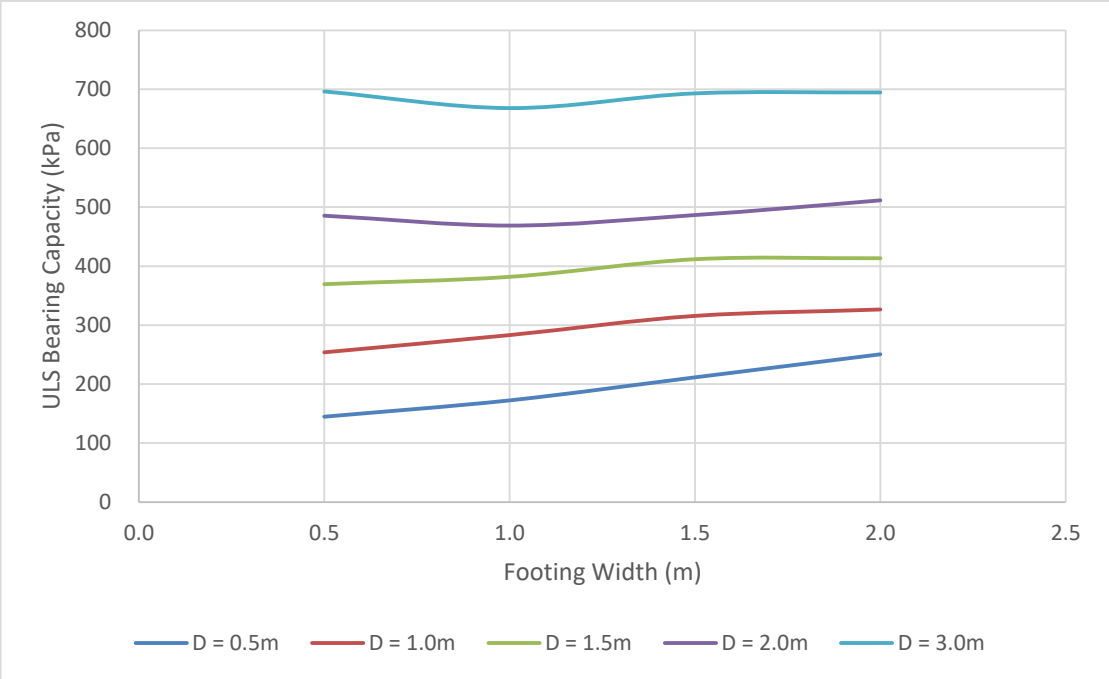

Site F Existing Fill

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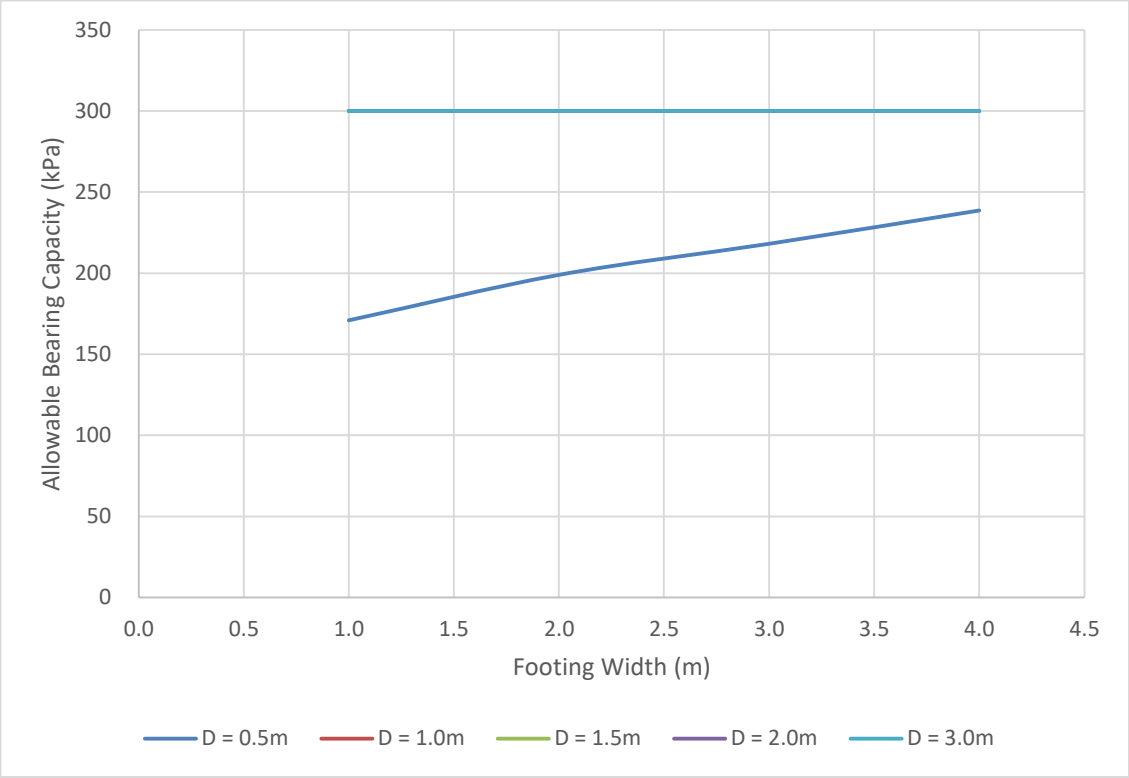
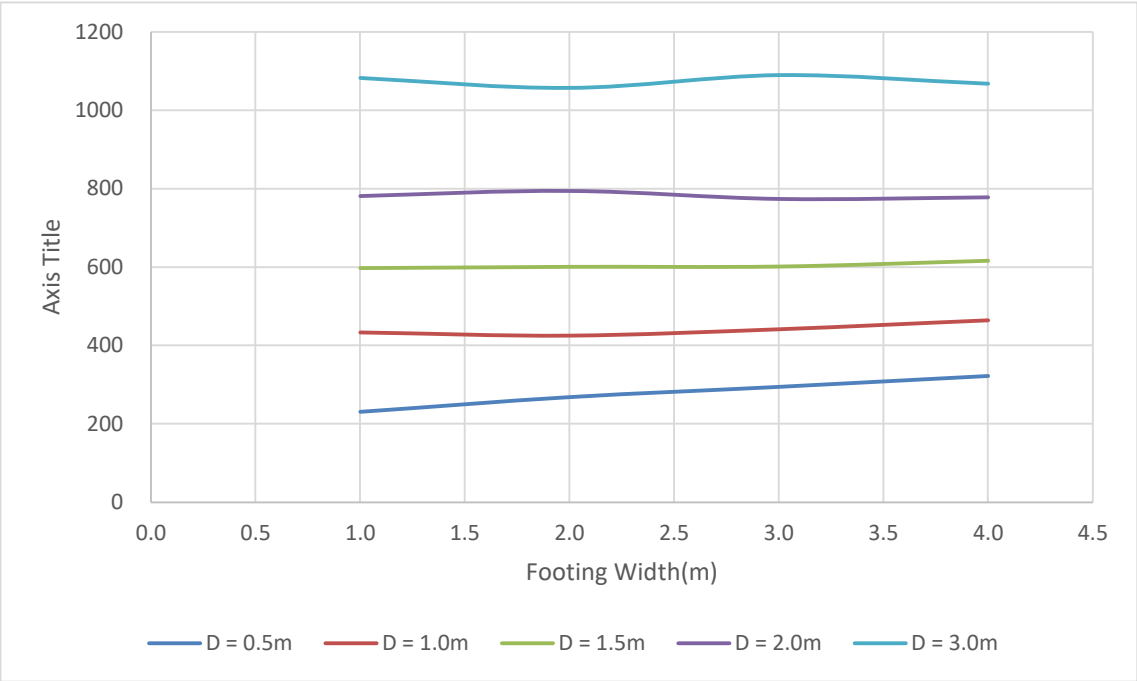
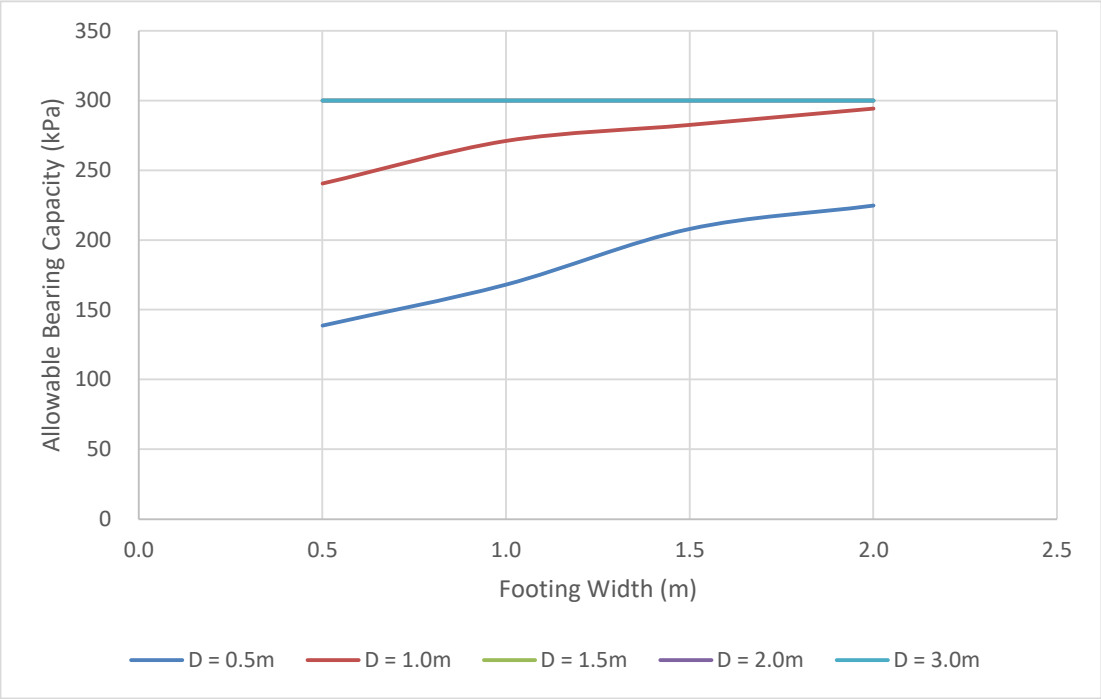
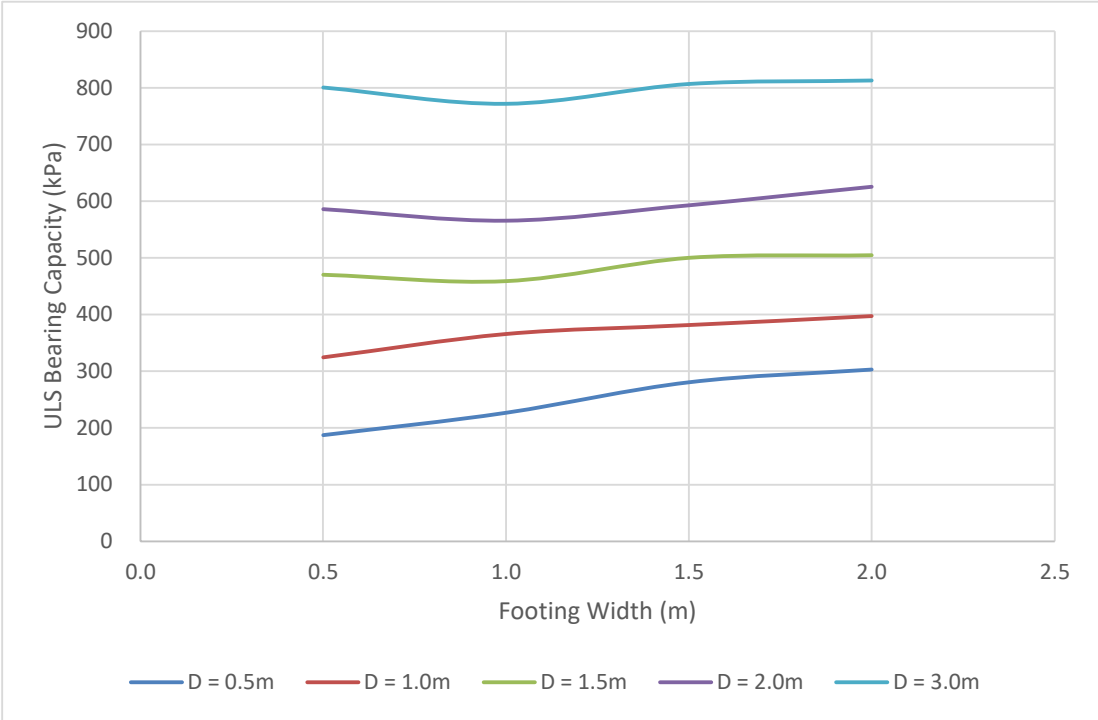




coffey A TETRA TECH COMPANY	client: Clough
	project: Perdaman Urea Geotechnical Investigation
	title: Bearing Capacity - Pad Footings
	job no: 754-PERGE271567





Sand Banks

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project:	**Perdaman Urea Geotechnical Investigation**
title:	**Bearing Capacity - Strip Footings**
job no:	**754-PERGE271567**

Appendix F
Fill Requirements

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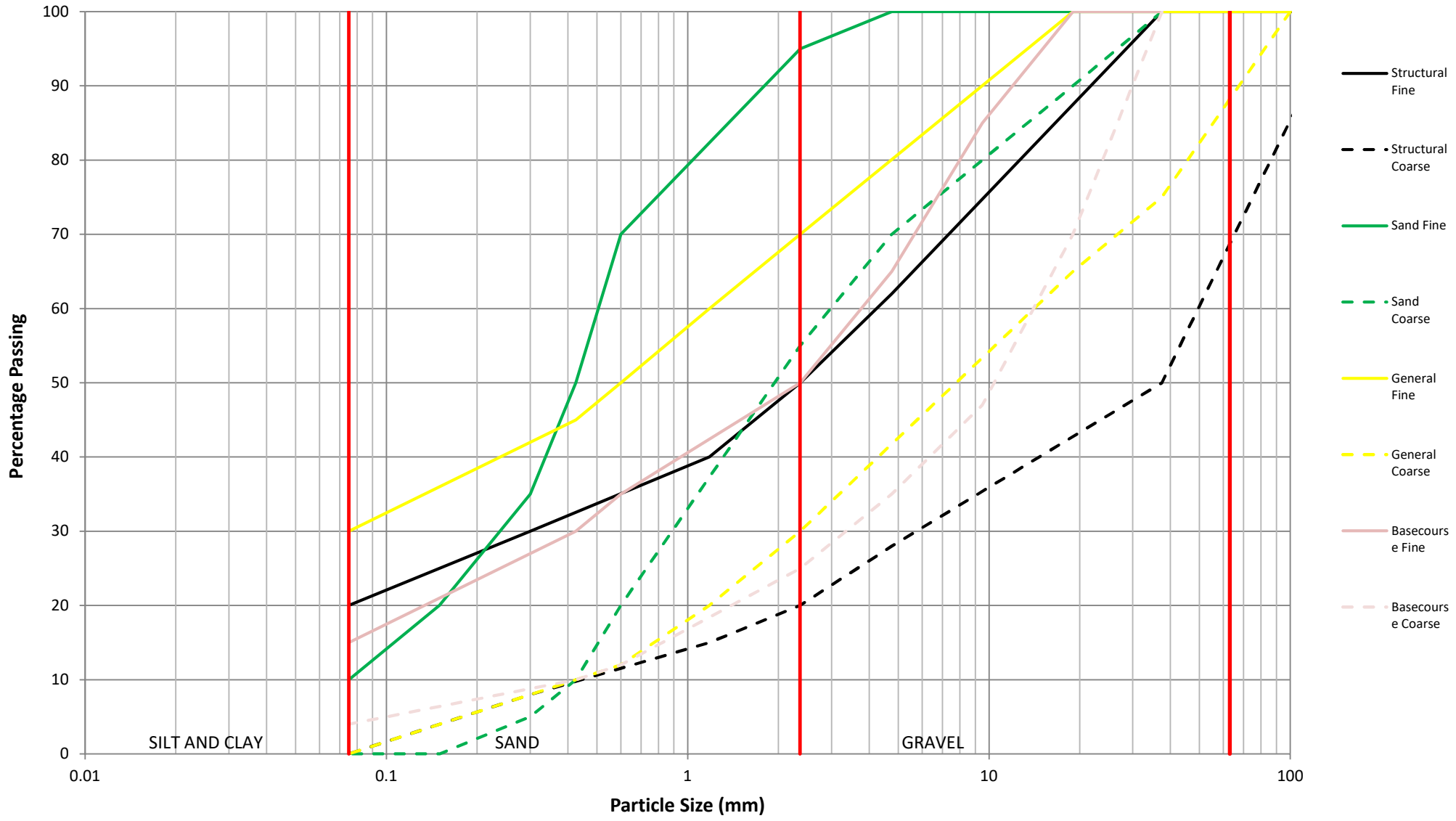
Grading Envelope – All Types

Grading Envelope – Basecourse

Grading Envelope – Structural Fill

Grading Envelope – General Fill

Grading Envelope – Sand Fill



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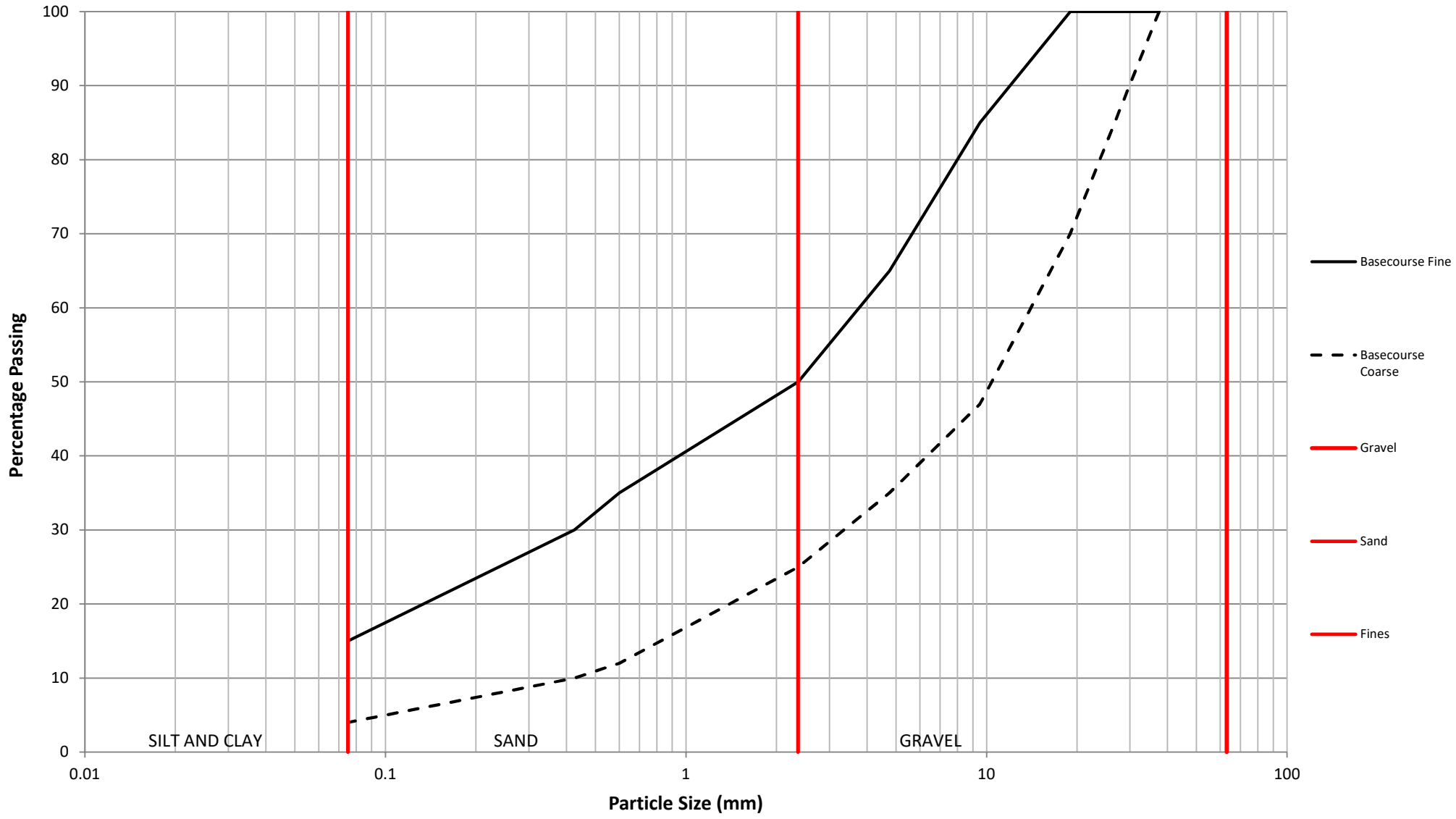

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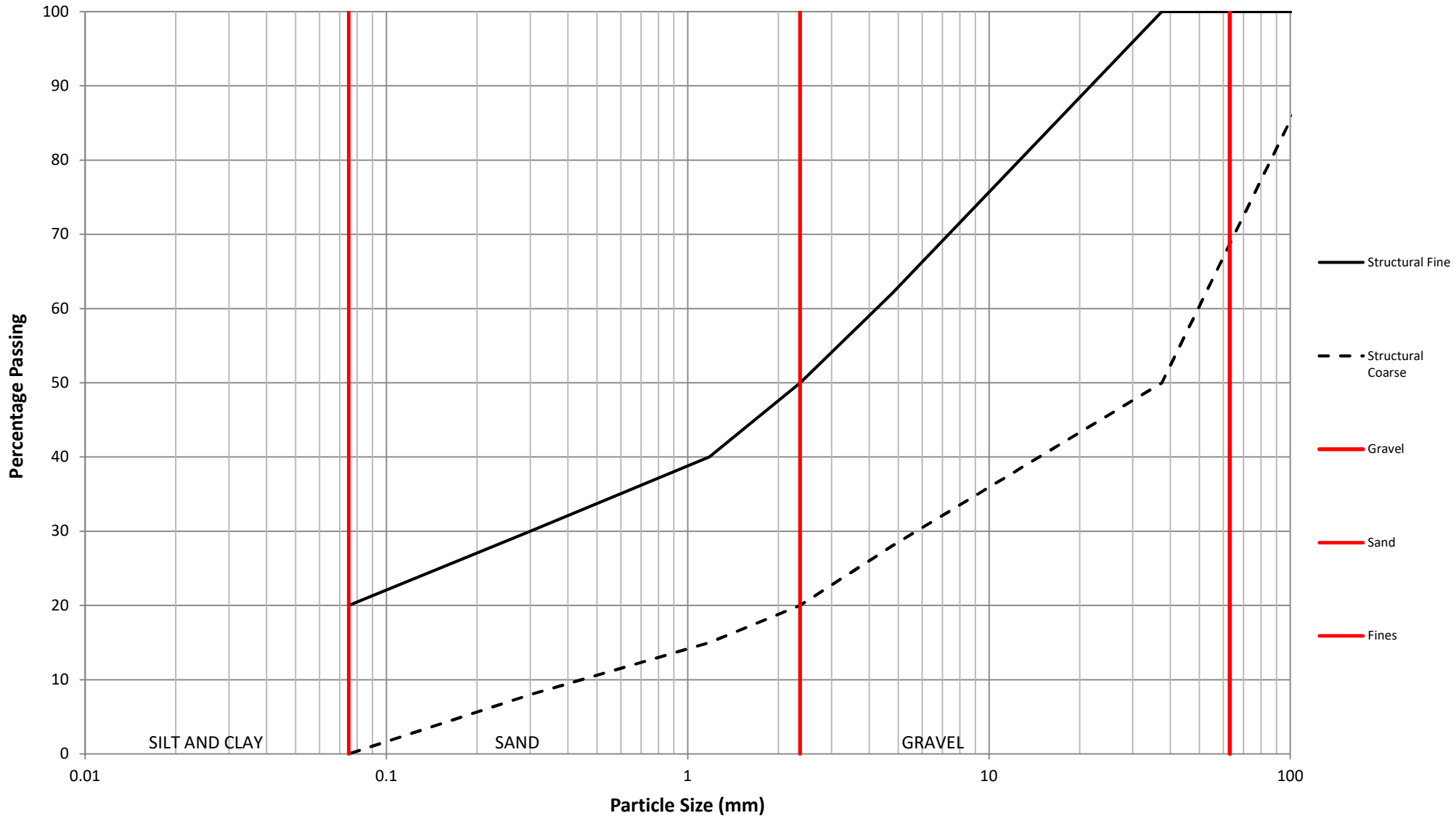

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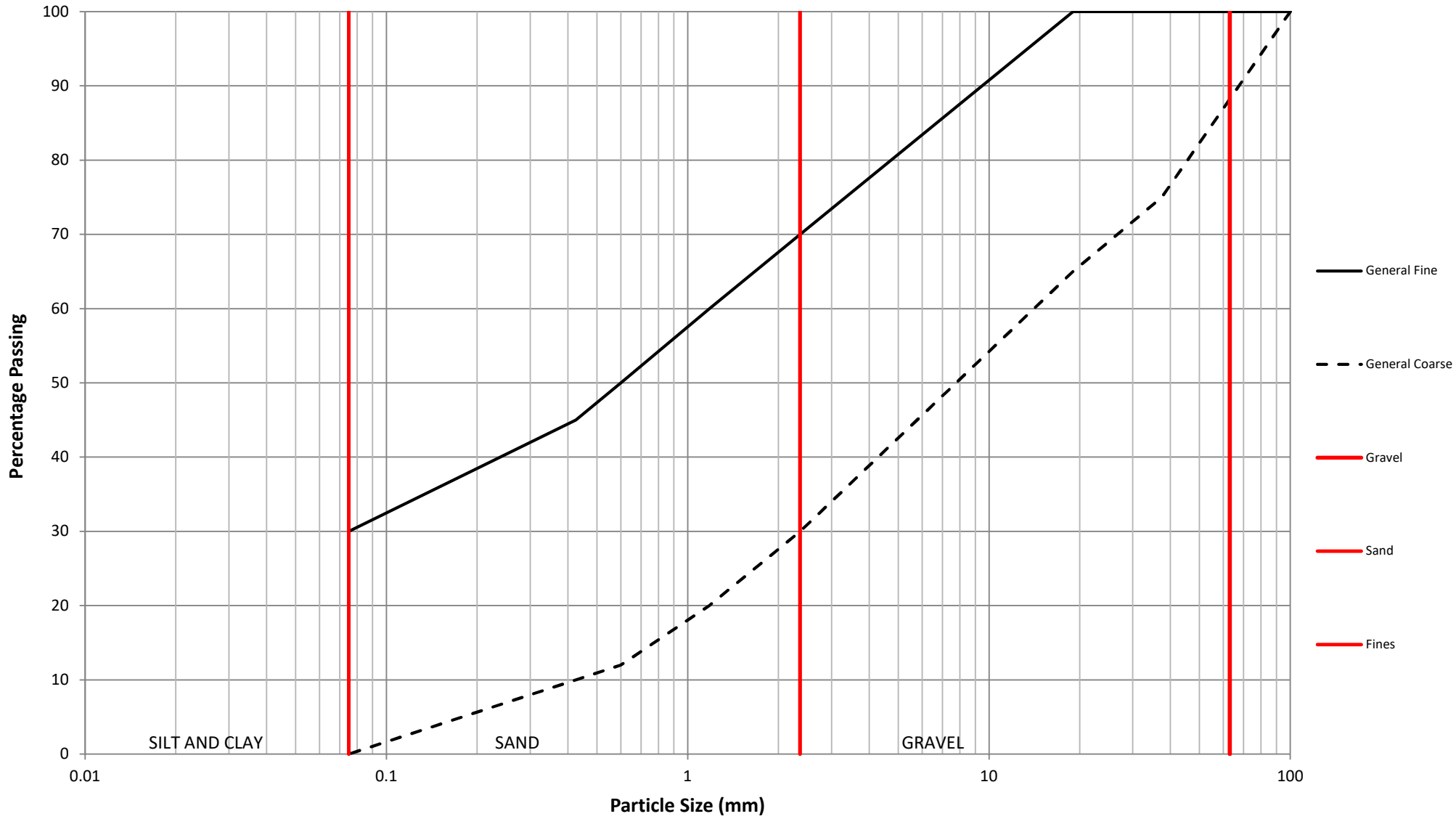

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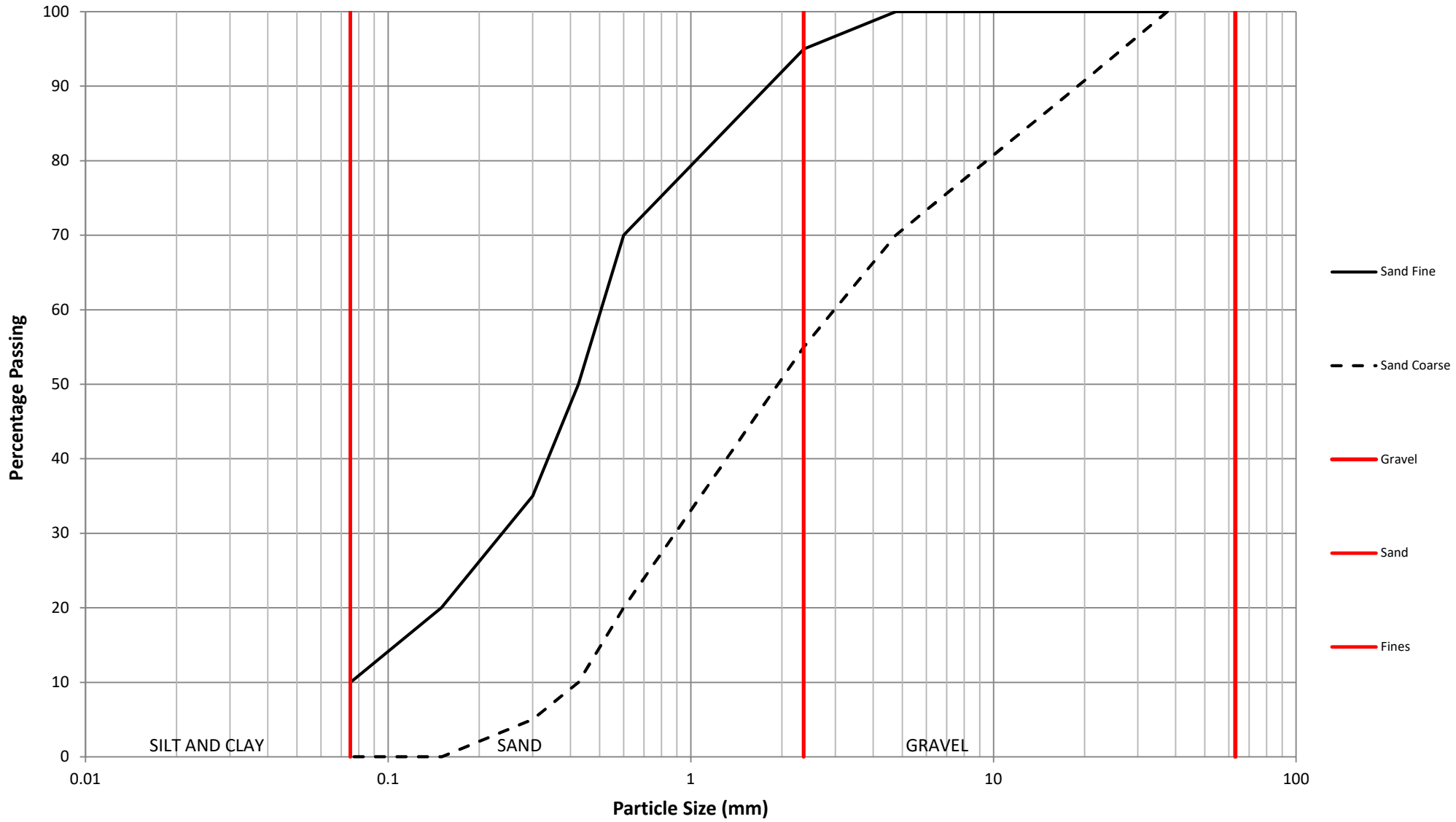

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original size	A4		project no: 754-PERGE271567	graph no: FIGURE F5

Attachment F. Letter to EPA for MAC consultation on Project Destiny

31st January 2022

Robert Hughes
Environment Protection Authority
Prime House
8 Davidson Terrace, Joondalup
Locked Bag 10, Joondalup DC, WA, 6919

Regulator References:
Department of Water and Environmental Regulation, Part IV Assessment No. ***2184, MS 1705***
Department of Agriculture, Water and the Environment, EPBC Assessment No. ***2018/8383***

Dear Robert,

Re: Perdaman Urea Project – MAC Consultation

I am writing to you on behalf of the Murujuga Aboriginal Corporation (MAC) and its board members regarding the Perdaman Urea Project (the Project).

On the 24th January 2022, Perdaman and its EPC Contractors comprising Saipem and Clough, visited the MAC offices to present a series of management plans to myself and the MAC Board. The presentation commenced by revisiting the previous consultations undertook by Perdaman over the past four years and was presented by the Perdaman Chairman, Mr Vikas Rambal.

The following Environmental Management Plans were presented in three sessions during this consultation:

1. Flora Management Plan;
2. Surface Water Management Plan;
3. Greenhouse Gas Management Plan;
4. Fauna and Threatened Species Management Plan;
5. Light Management Plan; and,
6. Cultural Heritage Management Plan

The MAC Board were also offered a discussion opportunity for each Plan and minutes were recorded by the EPC Contractors representative. The minutes were distributed after the meeting to myself and the MAC board and is considered a true and accurate record of the meeting.

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PO Box 1644, Karratha WA 6714
murujuga.org.au

The MAC Board were also offered a discussion opportunity for each Plan and minutes were recorded by the EPC Contractors representative. The minutes were distributed after the meeting to myself and the MAC board and is considered a true and accurate record of the meeting.

The CHMP presentation highlighted the proposed salvage and relocation works of three Heritage sites in accordance with the Section 18 AHA application; comprising site ID: #18615, #19239 and #19874.

On the 28th January 2022, Perdaman was provided notice that consent (with conditions) under *Section 18(3) Aboriginal Heritage Act 1972* was granted.

Conditions applied to the consent requires Perdaman to develop the Cultural Heritage Management Plan (CHMP) in consultation with MAC Heritage and Rangers and be endorsed by myself and Circle of Elders.

On the 31st January 2022, Perdaman with its EPC contractors once again visited MAC to present to myself and Circle of Elders to gain endorsement of the CHMP and more specifically the salvage and relocation proposal.

The Circle of Elders and myself endorse the amended CHMP and Salvage and Relocation methodology.

Yours sincerely,

[redacted]

Chief Executive Officer
MURUJUGA ABORIGINAL CORPORATION

Copy: Hon Dr Tony Buti MLA, Minister for Aboriginal Affairs
Vikas Rambal, Perdaman

+61 (6) 9144 4112 admin@murujuga.org.au
ABN 67 027 965 074 - 2 Sheet
313 KING BAY ROAD, DAMPIER WA 6713
PO BOX 1544, KARRATHA WA 6714
murujuga.org.au

Attach

ment G. MAC Consultation – 24th Jan 2022

Attachment H – Tetra Tech Coffey 2022a Detailed Site Investigation for Acid Sulfate Soils (for Clough)

Perdaman Urea Project – Project Destiny

Detailed Site Assessment for Acid Sulfate Soil

Perdaman Chemicals & Fertilisers Pty Ltd c/- Clough Saipem Joint Venture

Reference: 754-PEREN297100

19 April 2022

PERDAMAN UREA PROJECT – PROJECT DESTINY

Detailed Site Assessment for Acid Sulfate Soil

Report reference number: 754-PEREN297100
19 April 2022

PREPARED FOR

Perdaman Chemicals & Fertilisers Pty Ltd c/- Clough Saipem Joint Venture

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QUALITY INFORMATION

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Revision	Description	Date	Author	Reviewer	Approver
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Draft B	Draft for internal review	08/04/2022	Bernie Weekes		-
Draft C	Draft for client review	14/04/2022	Bernie Weekes		
Draft D	Final draft (issued for review)	19/04/2022	Bernie Weekes		

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Restriction on Disclosure and Use of Data
This report is subject to Tetra Tech Coffey's Statement of Limitations.

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1. INTRODUCTION

Tetra Tech Coffey Pty Ltd (Tetra Tech) was engaged by Perdaman Chemicals & Fertilisers Pty Ltd c/- Clough Saipem Joint Venture to undertake a Detailed Site Assessment (DSA) for Acid Sulfate Soil (ASS), for input into a Final Investment Decision (FID) for 'Project Destiny' a proposed Perdaman Urea Plant (PUP) on the Burrup Peninsula in the Pilbara Region of Western Australia (hereafter referred to as the 'Site'). An in-text site locality plan showing the extent of the Perdaman Urea Project – Project Destiny and the battery limit for the DSA is shown in Figure 1.

1.1 BACKGROUND

Project Destiny has been awarded 'Project of State Significance' status by the Western Australian State Government, which is set to kick start a new wave of local manufacturing in the State creating local jobs and supporting the local community in the Karratha and Dampier region. The PUP will be Australia's first urea export project supplying the growing Asia Pacific demand and where possible, will invest in the employment of the local workforce.

An agreement between Perdaman Industries (Chemical & Fertilisers) and the Western Australian Land Authority (WALA) has been reached to lease Site C and Site F for a period of 40 years which will allow Perdaman Industries to establish an export plant which will make a positive contribution to the Western Australian economy.

The Burrup Strategic Industrial Area (BSIA) is a well-established strategic industrial estate with vacant land for strategic heavy industry near gas, port, and other key infrastructure in the Pilbara region. Perdaman's FID will support the development goals of DevelopmentWA in line with the Burrup SIA and precinct land use and development strategies of the Port of Dampier including:

- Extend the life of the Dampier Cargo Wharf (DCW)
- Extension of the DCW
- Maximise space for laydown areas in the Port Services Precinct (PSP)
- Support the development of future pipeline corridors
- Maximise the use of the Burrup Services Corridor.

As part of working towards an FID several environmental assessments are required to meet formal conditions issued by the Environmental Protection Authority (EPA) within Ministerial Statement MS1180 under Part IV of the Environmental Protection Act, 1986.

Cardno was engaged by Perdaman in 2020 to prepare an Environmental Review Document (ERD) (Cardno, 2020) to inform an Environmental Impact Assessment (EIA) of the Proposal for public review and assessment by the Environmental Protection Authority (EPA) in accordance with Section 38 (Part IV) of the Environmental Protection Act 1986 (EP Act). The ERD built upon work previously undertaken by or in collaboration with the Proponent, the Government, non-governmental organisations (NGOs) and other projects in the region. Baseline studies, stakeholder engagement and preliminary impact studies commenced in November 2018. The results of these specialist studies and Management Plans prepared for the Project have been incorporated into the Project design (Cardno, 2020).

Subsequent to the completion of the EIA in 2020, and pursuant to Section 45 of the Environmental Protection Act 1986 (EP Act), it was agreed by the EPA that Perdaman's proposal may be implemented and that the implementation of the proposal is subject to conditions and procedures as detailed in Appendix 2 of EPA assessment No. 2184. Specific conditions relevant to this ASS study include:

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- The Proponent shall undertake intrusive acid sulfate soils investigations in accordance with the requirements of the Department of Water and Environmental Regulation's (DWER) guideline on the *Identification and investigation of acid sulfate soils and acidic landscapes* (DER, 2015) at least six months prior to Ground Disturbing Activities
- If acid sulfate soils are disturbed during the implementation of the proposal, the proponent shall treat and manage acid sulfate soils in accordance with the requirements of the DWER's guideline on the *Treatment and management of soil and water in acid sulfate soil landscapes* (DER, 2015).

The above conditions were formulated by the EPA because in Cardno's ERD (2020) a plausible risk for increased acidity within surface and groundwater from the disturbance of PASS was identified. Increased acidity in surface and groundwater at the Site is a concern due to the proximity of King Bay to the west of the Site and the possible impact acidified waters could have on environmental values in marine receptors.

The risk associated with ASS is substantiated by the following lines of evidence:

- Proposed construction requires disturbance of greater than 1,000 tonnes of soil
- The southern half (~17 ha) of Site C and a causeway approximately 1.5 ha in size will be established within a High to moderate risk of ASS occurring within 3 m of natural soil surface in accordance with the ASS Risk Map, Pilbara Coastline (DWER-053a)
- Construction activities will involve excavation or cut of soil and rock above 4 mAHD across the northern half of Site C and southern half of Site F and placement of fill across lower portions of the Site at ~2 mAHD to raise invert levels for construction. Filling of lower portions of the Site could displace ASS resulting in oxidation processes
- Dewatering of inundated areas of the Site will be required during construction to create dry working environments and this will expose shallow surface soils within supratidal areas to oxidation processes likely to cause acidification

Now in 2022, Perdaman Chemicals & Fertilisers Pty Ltd c/- Clough Saipem Joint Venture have requested Tetra Tech undertake the works required to comply with Condition 7-1 of MS1180 for ASS management.

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Figure 1: Site Location

1.2 PREVIOUS GROUND INVESTIGATION WORKS

In 2020, Enveng Group was engaged by Clough to complete an Environmental Testing and ASS Preliminary Assessment at the Site. A report was prepared in accordance with the scope of services discussed in the Contract letter between Clough and Enveng Group in relation to the Perdaman Urea project ASS Geotechnical Assessment carried out by Coffey. The purpose of the geotechnical investigation and subsequent data analysis was to determine whether the soil profile in the project excavations contain ASS, which may be disturbed during the Project construction phase. A copy of Enveng group's report is provided within Appendix I:.

The scope of works carried out by Enveng Group comprise:

- Review of the field data borehole and test pit logs and photography
- Review of lab analysis results
- Assessment and discussion of results received and subsequent determination of risk of encountering ASS during construction
- An interpretive report displaying results, assessment, risks and recommendations

An assessment of the occurrence of ASS was made based on interpretation of ASS field results from 30 primary samples, and 18 of the 30 samples were selected for further analysis including Chromium Reducible Sulfur (S_{CR}) suite and Suspension Peroxide Oxidation Combined Acidity and Sulfur (SPOCAS) suite. The samples were collected from different intervals across test pits located within high to moderate ASS risk areas on-site.

Field screening results indicate that soils sampled were basic. The observed reaction rates when subject to peroxide digest were inconsistent across the investigated site raging from Low to Extreme. Further laboratory chemical testing was conducted to determined acidity and reported five samples where Spos exceeded the assessment criteria of 0.03% S with the exceedances ranging between 0.06 %S and 0.1 %S and associated with shallow soil horizons generally between 0.25 mBGL and 1.0 mBGL. S_{CR} results were all reported as less than laboratory limits of reporting (LOR's). Enveng Group's conclusion in the report was that exceedances for the SPOS in these five samples can be attributed to organic forms of sulfur and the assessment should rather take into consideration SCR results. On this basis, samples are not considered to contain AASS or PASS and will not require treatment.

1.3 ACID SULFATE SOILS – DEFINITION

Acid Sulfate Soils are formed naturally, under waterlogged iron and sulfate rich conditions, being typical of coastal lowlands where the land has been subject to inundation by sea water. These soils contain iron sulfide minerals (most commonly pyrite) or their oxidation products. These soils remain stable under anaerobic conditions but exposure to air can lead to their oxidation with the result being the formation of sulfuric acid and the release of iron, aluminium and other trace metals and nutrients from soils into groundwater and surface water bodies.

Disturbance of subsurface soil materials and/or groundwater containing ASS introduces a risk of environmental harm and as such requires management to minimise the associated risk. Earthmoving, dewatering and drainage works can result in exposure of these soils to oxidation either directly; or indirectly through the lowering of water-tables. Potential Acid Sulfate Soils (PASS) are soils containing iron sulfide minerals that have not already been oxidised. Field pH is higher than 4 and is commonly neutral to alkaline

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however soils still exhibit appreciable acidity upon oxidation. Actual Acid Sulfate Soils (AASS) are soils containing iron sulfide minerals that have undergone some oxidation. Field pH is lower than 4 and there is often mottled yellow and/or red colour within the soil profile indicative of jarosite formation.Objectives and Scope of Works

1.4 OVERARCHING OBJECTIVE

The primary objective of this investigation into the presence and extent of ASS at the Site is to allow Perdaman and its contractors involved in the development program to understand the risk of acidification occurring during excavation and dewatering and the viability of onsite management options for ASS and dewatering effluent and in consideration of DWER *Treatment and Management of Acid Sulfate Soils and Acidic Landscapes*, 2015 (DWER, 2015b).

1.5 TECHNICAL OBJECTIVES

The technical objectives specific to the DSA for ASS include:

- Assess soil and groundwater quality broadly across both Site C and Site F with close consideration for High to moderate ASS risk areas to understand the presence and magnitude of ASS within the proposed development footprint (Site C, Causeway and Site F)
- Determine whether soils within the supratidal and intertidal zone are a source of acidification or potential impact which may have been previously disturbed and may require management during construction
- Identify risks to on and offsite human health, environment, and environmental values, as well as uncertainties or critical gaps in information

1.6 SCOPE OF WORK

The proposed scope of work for ASS investigation will be conducted in general accordance with the requirements of the Department of Water and Environmental Regulation (DWER) guidelines on the identification and investigation of acid sulfate soils and acidic landscapes (DER 2015).

The scope of work proposed includes:

- Review pertinent desktop information or historical reports to gain a better understanding of site conditions and to identify any data gaps that may need to be investigated by the current ASS investigation
- Perform an intrusive soil investigation to determine the distribution of ASS at the site through the collection of soil samples and associated field and laboratory testing
- Installation and sampling of groundwater wells at the site to assess groundwater quality and determine susceptibility of groundwater to acidification via soil disturbance and dewatering
- Preparation of a report and management recommendations for ASS which details the location and extent of ASS within soil sample locations in the site area, presents a groundwater quality assessment and evaluates a risk assessment of soil and groundwater acidification during excavation and dewatering activities
- Should ASS be identified at the site and groundwater indicate a moderate to high risk of acidification via soil disturbance and/or dewatering, Tetra Tech will recommend appropriate management measures to be implemented for the treatment and management of soils and water during construction activities.

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2. SITE IDENTIFICATION

Site identification and historical information is summarised below from Cardno's Environmental Review Document (ERD) (2020), Tetra Tech's Preliminary Site Investigation (PSI) (Tetra Tech, 2022b) and SAQP (Tetra Tech, 2022c). For specific and supporting information, refer to the reports.

2.1 SITE DESCRIPTION

The Site consists of two primary development areas identified as Site C and Site F on relatively undisturbed land with a development envelope of 106.7 ha and an associated disturbance footprint of 73.05 ha. The Site is currently undeveloped except for minor areas of disturbance across Site F from off-road tracks and ground disturbance associated with historical land use i.e. Karratha Gas Plant Construction Laydown area. An unsealed access road running from Burrup Road to the Yara Ammonia Nitrate Plant intersects Site C. The Site is located within the Burrup Strategic Industrial Area (BSIA) on the Burrup Peninsula, approximately 8 km north-east of Dampier and 20 km north-west of Karratha. Access to both Site C and Site F is possible off both Hearson Cove Road and Burrup Road, Burrup Peninsula.

The Site location is shown on Figure 1 included within Appendix D:.

2.2 SITE INFORMATION

Site identification details are summarised in Table A. The Site layout is represented on Figure 2 included within Appendix D:.

Table A: Site Identification Details

Site Owner	Development WA
Site Proponent	Perdaman Chemicals and Fertilisers Pty Ltd ACN: 121 263 741
Site Name	Perdaman Urea Plant – Project Destiny
Site Address	Burrup Road, Burrup Western Australia
Traditional Owner (TO)	Murujuga Aboriginal Corp (MAC)
Applicable Land Tenure (CoT)	Part of Lot 472 on DP220595
	Part of Lot 566 on DP28209
	Part of Lot 567 on DP28209
	Part of Lot 568 on DP28209
	Part of Lot 581 on DP72793
	Part of Lot 598 on DP77665
Locality Plan	Figure 1
Site C & F study boundary	Figure 2
Local Government Authority	City of Karratha
Zoning	The site is zoned as Strategic Industry under the City of Karratha Local Planning Scheme No. 8 (District Scheme).
Current Land Use	**Site C** The majority of Site C is undeveloped land with no identified land use. Site C is dissected from Site F by an unsealed access track or service road which runs west to east between Burrup Road and the Yara Pilbara Fertilisers Plant ending on the western

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	boundary of Yara. A shorter unsealed access road branches off this main road running north to south providing maintenance access to the main brine return line. **Site F** The Site consists of mostly undeveloped land within the BSIA with a small section of the site dissected by Hearson Cove Road which runs east to west between Burrup Rd and Hearson's Cove.
Historical Land Use	Vacant Crown land managed by Development WA

Note: The BSIA pipeline corridor is excluded from this study.

2.3 CERTIFICATES OF TITLE

A summary of the CoTs is presented in Table B. Copies of relevant CoT's are included in Appendix B:.

Table B: Certificate of Title and Historical Site Ownership Details

Registration Date	CoT/Survey/Crown allotment	Volume	Folio	Identifier and Proprietor
01/03/2000	Part of Lot 472 on Deposited Plan 220595	LR3111	931	Pilbara Ports Authority of Level 3/16 Parliament Place West, Perth, WA, 6005
29/10/2002	Part of Lot 566 on DP28209	LR3125	317	State of Western Australia
29/10/2002	Part of Lot 567 on DP28209	LR3125	318	State of Western Australia
29/10/2002	Part of Lot 568 on DP28209	LR3125	319	State of Western Australia
27/06/2017	Part of Lot 581 on DP72793	LR3168	442	State of Western Australia
27/06/2017	Part of Lot 598 on DP77665	LR3168	439	State of Western Australia

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2.4 SUROUNDING LAND USE

A summary of the surrounding area land uses is included in Table C.

Table C: Summary of Land uses

Location	Land Use
North (beyond Site C):	Undeveloped, followed by district roads, Pluto LNG Park ~600m north-west, and Domgas/ Karratha Gas Plant ~1.5km north.
South (beyond Site F):	Murujuga National Park immediately south, followed by industry.
East (beyond Site C):	Yara Pilbara Nitrates Plant, ~50m from the boundary.
East (beyond Site F):	Murujuga National Park, Hearson's Cove (ocean) ~2.6km due east.
West (beyond Site C):	Conveyor belts, district roads, followed by various industry, ports and King Bay (ocean) ~400m due west.
West (beyond Site F):	District roads, followed by King Bay (ocean) ~600m due west.

3. DETAILS OF DEVELOPMENT

Perdaman Project Destiny will involve the construction of a 2.05 MTPA granular urea plant consisting of a Laydown area (Site F) approximately 32.6 ha (clearing of up to 30 ha), Utility Block (Site C) approximately 34

ha (clearing up to 34 ha), and a causeway 1.5 ha (clearing up to 1.5 ha) with a combined disturbance footprint of ~73 ha as shown in Figure 2.

Ground disturbance activities associated with construction will involve earthworks or cut and fill activities where soil and rock from above 4 mAHD across Site C and above 10 mAHD across Site F will be excavated and used as fill material for the construction of a causeway running between Site C and Site F. Enveng Group's Preliminary Assessment (2020) indicates that construction requires disturbance of greater than 1,000 tonnes of soil across the Site. Areas of the Site where earthworks are at most risk of disturbing ASS include the southern half of Site C and the causeway.

At the time of writing this report design information was not available for proposed infrastructure on Site C and F however, Overall Siteplan Sections for the causeway were provided to provide an understanding of invert and grade levels which can be interpreted to provide an understand of extent of ground disturbance. The Siteplan sections show the base of the causeway starting at a height of 2 mAHD which is ground surface level within the supratidal and intertidal zone of the Site upon which an approximate 3 m layer of sand bedding will be applied. Concrete culverts will be embedded within sand to permit the flow of stormwater from east to west across the supratidal and intertidal areas of the Site. A compacted fill layer 1.7 m thick will then be placed on top of the sand bedding layer to provide a base for final causeway road layers such as crushed aggregate and asphalt. Fill material will be used primarily on top of sand bedding to stabilise the causeway surface before final layers such as crushed aggregate, granular materials and asphalt are applied. The finished grade will be 6.15 mAHD. It is likely that dewatering will be required to an extent to dry work areas and to permit access for heavy vehicles during the construction of the causeway. The extent of dewatering required during construction is not understood but may involve sump pumping with discharge to an infiltration area or drying pond.

An interpretation of the client's cut and fill plan is provided as Figure 3A within Appendix D:. The proposed footprint and layout of infrastructure across Site C, Site F and the causeway is shown on Figure 3B within Appendix D:, and the client's cut and fill, and causeway site plan sections are included within Appendix E:.

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4. SITE ENVIRONMENTAL SETTING

Environmental information has been summarised below from the previously completed PSI (Tetra Tech, 2022b) and SAQP (Tetra Tech, 2022c), and Cardno's ERD (2020). For specific and supporting information, refer to the reports. The environmental setting of the site is summarised in Table D.

Table D: Summary of Environmental Setting

Topography	Large outcrops and ranges of fractured red boulder slopes dominate the rugged landscape of the Burrup Peninsula. The land is elevated from the typically low and flat coastal plains of the west Pilbara. There are numerous gorges, creeks and drainage lines cutting across the landscape, which provide variety in the landscape. This landscape is distinctive in its appearance and is restricted to the Burrup Peninsula and some nearby islands and adjacent mainland. In overall morphology, the Burrup Peninsula is divided into two sections. Between Hearson Cove and King Bay, a low-lying expanse of supratidal mud flat and sand dunes, between one and two kilometres wide, effectively separating the northern and southern elevated rocky sections of the Peninsula. Tidal mud flats characterise the sheltered bays along both eastern and western coasts of the Peninsula including northern Conzinc Bay, Hearson Cove, Cowrie Cove, and Watering Cove) (Cardno, 2019). The following broad landscape character types can be found at or near the Project site: • Coastline - the Burrup Peninsula coastline and the waters of the Dampier Archipelago and the Indian Ocean, including the bays (Kings Bay, Withnell Bay, Conzinc and Hearson's Cove), Dampier Islands (approximately 54), and the foredunes, mangroves and sandy beaches • Lowlands - drainage channels and 'narrow valleys', scrublands, and the supratidal flats • Rocky outcrops - the steep rugged red rock scree slopes in the north and south of the Peninsula • Industry/Urban - including the Burrup Strategic Industrial Area (BSIA) and the Dampier Port and wharves, industrial islands of Dampier and Karratha townships.
Elevation	**Site C** The elevation of Site C ranges from approximately 30m above heigh datum (mAHD) at the northern boundary, to 2m AHD at the southern boundary, near the location of the tidal flats which separate Site C and Site F. The site is relatively flat, sloping marginally from west to east differing in height by approximately 5m AHD. The inverse of Site C is applicable for Site F, ranging from approximately 2m AHD at the northern site boundary, in the tidal flats, to approximately 30 mAHD at the southern boundary. **Site F** The elevation of Site F ranges from approximately 30m above heigh datum (mAHD) to north, to 2m AHD to the south, near the location of the tidal flats which separate Site C and Site F. The site slopes from east to west, ranging from a height of 24m AHD to 7m AHD respectively.
Climate	The Burrup Peninsula and Karratha area have a semi-arid climate with tropical savannah climatic influence. The general seasonal characteristics comprise of hot summers with periodic heavy rains (October to March) and milder winters with occasional rainfall (April to September). Overall, however, annual conditions are relatively dry with a mean maximum rainfall of 297.6mm. Mean monthly maximum temperature is 32.5°C with the highest temperatures recorded in March and the mean minimum temperature is 20.9°C with the lowest monthly mean temperature recorded

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in July. Tropical cyclones occur between December to April with winds up to 250 km/hr, heavy swells, and torrential rain likely, (SKM, 2011).

A graph of mean monthly rainfall and temperature is presented over page (Graph 1).

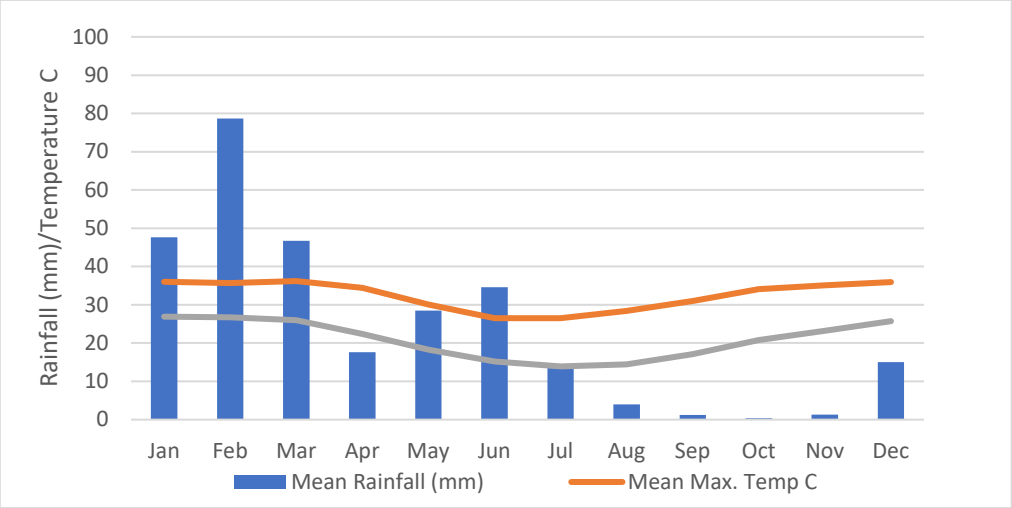

Chart A: Rainfall & Temperature (BoM Station No. 004083 – Karratha Aero)

Regional Geology

The study area is in the Pilbara Region. The Australian Soil Resource Information System (ASRIS, 2018) describes the landforms of this region as; dissected plateaus; hills and ridges; undulating plains; alluvial plains.

The 1:500,000 Interpreted Bedrock geology map (Geological Survey of Western Australia, 2016) indicated that the site is underlined by Gidley Granophyre described as fine to medium-grained granophyre; commonly porphyritic; underlain by gabbro.

The surface geology at the site is described by Geoscience Australia 1:250,000 Dampier geological map sheet as Quaternary (Qc and Qs) and detailed as:

- Colluvium - sand, silt, and gravel in outwash fans; scree and talus; proximal mass-wasting deposits
- Aeolian sand - red-yellow, wind-blown sand; local sand ridges
- Dolerite and Gabbro dykes may also occur.

Saline flats are in a sediment-filled strait between King Bay and Hearson's Cove. The soils of the mudflat area are typically alkaline due to the high carbonate content originating from marine sand and underlying calcrete bedrock.

Site Geology

Geological mapping of the area shows the site to be underlain by Colluvium of sand, silt, and gravel, which is in turn underlain by the Gridley Granophyre. The supratidal areas are shown to be underlain by silt and mud in supratidal to intertidal lagoons. These are represented as outwash fans that have a soil profile associated with a low energy marine depositional environment. These sediments are typically organically rich and often contain a thin veneer of shelly lenses. A curved thrust fault extends through Site C, which generally reflects topography.

The granophyre is the dominant rock type, which is characterised by extremely high intact rock strength. When exposed to weathering, the rock surface forms a characteristic surface of boulders that may become loose from the rock mass. Previous investigations near site indicated a greater degree of weathering than normal for this unit, which is consistent to its proximity to an incised channel.

Recent investigations undertaken by Tetra Tech revealed the following succession:

- Fill: Gravelly clayey sand, mixture of granophyre and calcrete gravel. Difficult to establish boundary of fill and underlying colluvial gravel. It is understood that these are present mainly across the north-western area of Site F

	• Intertidal deposits: Loose sand, pale brown, calcareous with shells and soft to very soft clay. These intertidal deposits are mainly sand or a mixture of sand and calcrete gravel. Clay layers are located toward the centre of the tidal flats • Calcrete (tidal area): pale grey to red or gravel, vughy • Colluvial gravel: clayey gravel present across majority of site, which includes granophyre boulders • Weathered Granophyre, present across majority of site • Brecciated/Cemented Granophyre: Secondary cementation by $CaCO_3$, not uniformly distributed, mainly found on colluvial slopes adjacent to tidal flats • Fresh Granophyre: Fractured • Dolerite: Extremely weathered to residual clayey gravel, present in localised areas in the northern area of Site C.
Hydrogeology	The main aquifer in the area is the Pilbara Fractured Rock Aquifer consisting of Precambrian granite-greenstone terrain overlain by superficial sediments in river valleys. The fractured aquifers are usually of low permeability with limited storage with yields controlled by the position, extent, and size of fracturing. Superficial sediments may act as perched aquifer bodies where geological conditions allow this. Recent investigations undertaken by Tetra Tech measured groundwater levels between 0.41 to 13.96 mBGL or 0.03 to 5.02 mAHD. This is generally consistent with earlier investigations in late 2021. Groundwater levels follow topography with the shallowest levels measured at the discharge point within the intertidal zone, where groundwater is noted to be expressed as surface waters during periods of high rainfall. Groundwater flow within the Gidley Granophyre appears to be preferentially directed along localised areas of fracturing and weathering, which have enhanced the permeability and storage potential of the aquifer. Where these flow paths exist, there is evidence of interconnection with the overlying superficial deposits. This is evident in MW10 where both superficial deposits and fractured granophyre were encountered. Here, Electrical Conductivity is seen to be around 8,600 µS/cm (brackish in nature) compared to levels of an average of around 6,800 µS/cm in other wells intersecting the granophyre and average levels of around 160,400 µS/cm (hypersaline in nature) in wells only intersecting the superficial deposits. This appears to show evidence of intermixing of waters in this area. This is also shown by the elevated levels of redox at this location, which show an oxygenated environment as opposed to a reducing environment. Where fractures and weathering are not prevalent, very low levels of seepage have been noted from the granophyre rock matrix. Therefore, levels of interaction between the primary rock matrix and overlying superficial deposits is likely to be very low, effectively resulting in the superficial aquifer acting as a perched aquifer throughout most of the area where underlying fracturing in the granophyre is not present. Both the granophyre and the superficial deposits are noted to be unconfined in nature. Previous studies have confirmed groundwater quality to be hypersaline with TDS concentrations greater than seawater, (40,000-50,000 mg/L) which is thought typical of supratidal environments that are subject to greater evaporation rates, (HLA Envirosciences, 1999). Groundwater flow direction is toward the South-southwest (Site C) and North-northwest (Site F) with discharge to the supratidal flats and King Bay. However, groundwater levels are noted to be significantly affected by tidal variation in this area and this is very likely to affect groundwater flow direction with groundwater flow likely to be reversed during periods of high tide. The hypersaline conditions within the supratidal deposits shows that this aquifer system is essentially tidal dependent with groundwater sourced predominantly from seawater with minor contributions from the underlying granophyre where this is fractured. The extent of fracturing within the granophyre and its connection with the overlying supratidal sediments is of more importance in relation to potential contaminant flow, where fracturing will cause

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	preferential pathways for contaminant migration. However, it is considered that a greater risk is observed from direct discharge to the supratidal deposits.
Public Drinking Water Areas	There are no recorded Public Drinking Water Areas within or in proximity of the site.
Surface Water Features	The site is located within the Port Hedland coast basin and Karratha coast catchment. There are no permanent surface water bodies noted to be present on the site. However, three ephemeral surface water creeks are inferred to pass through the Site F area with eventual discharge to the supratidal flats and King Bay. Although no ephemeral creeks are noted to pass through the Site C area, there are a number that are positioned to the north of this area, which may produce run-off into the Site C area during high rainfall events. Two surface water pools have been noted that are positioned around 900 m to the north and 1.3 km to the northwest of the Site C area, respectively. The closest permanent surface water bodies to the proposed site areas are features of the marine environment, namely King Bay, located around 700 m east of the site at its closest point and Hearson Cove, (Indian Ocean) located 2 km west of the site. Rainfall is expected to directly infiltrate through the soils to recharge groundwater, evaporate at the surface or be consumed by vegetation in the root zone. Overland flow will occur during wet periods with the mudflats draining westward into King Bay. During heavy rains and extreme spring tides, the tidal mudflats between Sites C and F are subject to flooding and inundation. In addition, it is noted that during significantly high tide (spring tide) events, supratidal waters are known to extend from the western part of the peninsula from King Bay over to the eastern coastal area and discharge into Hearson Cove. A site visit conducted on 29 November 2021 observed the movement of surface water in a westerly direction across the supratidal area however, it could not be determined at the time if this was a localised phenomenon i.e. flow of water from a high point to a shallow point within the supratidal area and an influence imposed on surface water by rising and falling groundwater levels influenced by strong tides in King Bay and Hearson's Cove.
Wetlands	A search of the Protected Matters Database (DoEE, 2021) indicated that there are no Ramsar or Directory of Important Australian wetlands at the Project site, or within 10 km of the site. The closest Ramsar wetland (Eighty-mile Beach wetland) is located approximately 310 km to the northeast of Karratha. The closest Directory of Important Australian wetlands (Leslie Salt Fields System) is located approximately 200 km to the northeast of Karratha.
Acid Sulfate Soil	A review of the ASS Risk Map , Pilbara Coastline (DWER-053) indicates the occurrence of High to moderate risk ASS within the supratidal zone of Site C and causeway. A moderate to low risk ASS area is also observed in the north west corner of Site C. Refer to Figure 4 for ASS risk map. Additionally, the ASRIS National ASS Atlas was reviewed to validate accuracy of the DWER ASS risk map, and a High probability of Occurrence features. In summary, the two sources correlate with each other. It is noted in the DER guidelines (2015) that the risk maps are not intended to depict actual acid sulfate soil risk at an individual property level and is used in this study as a broad-scale planning tool. As such, the DWER stipulates that sites should be investigated further, if "lowering of the water table, whether temporary or permanent" is proposed in areas depicted in an ASS risk map as Class II as a "moderate to low risk of AASS or PASS occurrence within 3m of natural soil surface" and particularly at sites situated within a mapped "moderate to high" risk area (generally associated with wetlands). A preliminary assessment of ASS completed by Enveng Group (Enveng group 2020) involving ASS field testing shows that soils within High to moderate risk areas are basic. Validation of these field test results by conducting SPOCAS and S_{CR} suite was

	conducted to determine Net Acidity and testing reported five samples where SPOS exceeded the assessment criteria of 0.03% S with the exceedances ranging between 0.06 %S and 0.1% S. Exceedances were generally associated with shallow soil horizons generally between 0.25 mBGL and 1.0 mBGL
Sensitive Ecological Receptors	Mangrove communities are noted to exist around 500 m west of the proposed site area at the entrance to King Bay and at the northern end of the beach located at Hearson's Cove. Within the north west portion of Site C Rockpiles of the Burrup Peninsula occur. The rockpiles are noted as 'Protected Ecological Communities'. Vegetation condition is rated as generally Very Good to Excellent across both land and mudflats. Several fauna habitats occur including surface water drainage lines, Hummock Grasslands on Mid Slope, Rocky Outcrops, and Samphire Shrubland/ Supratidal flats. Centrally located within Site F, several 'Protected Ecological Communities' occur including Cultural Heritage sites. Vegetation condition is rated as generally Good to Excellent across both land and mudflats. The most dominant fauna habitat found across Site F is Hummock Grassland with several major drainage lines traversing hill side in the south east corner of the site footprint. Regarding matters of National significance, a search of the Department of Agriculture, Water and the Environmental database for threatened ecological communities (TECs) was completed and search results did not find any 'Listed Threatened Ecological Communities' within either Site C or Site F. Numerous listed threatened species (up to 30) and listed migratory species (up to 41) were identified in the region with too many search results to list in the report. An EPBC Act Protected Matters Report detailing the findings of search results is presented in the PSI. Regarding Wetlands, a search of the Protected Matters Database (DoEE, 2021) indicated that there are no Ramsar or Directory of Important Australian wetlands at the Project site, or within 10 km of the site.

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5. SOIL SAMPLING METHODOLOGY

5.1 SOIL SAMPLING (SEPTEMBER 2020)

A limited investigation for ASS was performed by Coffey in 2020 at the same time as a geotechnical study. The investigation involved collection of ASS samples for testing in addition to geotechnical sampling and testing. At 11 geotechnical sample locations (TP-18, TP-38, TP24, TP58, TP50, HA-TP51, HA-TP57, TTP03, BH02, BH27 and BH12) across Site C and the causeway samples were taken from test pits, hand auger holes and drilled bore holes. Samples were generally collected from 0.25, 0.5, 0.75, 1.0 and 1.25 m discrete depth intervals. A total of 30 soil samples were collected from 11 sample locations. Supplementary geotechnical bore logs are presented in Appendix H:.

The sample locations were selected based on proximity to the high to moderate ASS risk area that occurs across the supratidal zone of the Site and within areas where ground disturbance is anticipated or expected.

Soil samples were collected by a geotechnical engineer by hand from the noted sample intervals and all samples were placed in laboratory grade sample bags for preservation and shipping to the laboratory. All samples were recorded on a CoC and submitted to a NATA accredited laboratory for analysis.

Regarding laboratory analysis, 30 samples were tested for pH_F and pH_{FOX} and subject to screening results further chemical testing was performed on 18 samples involving either S_{CR} or SPOCAS testing.

The results of testing are detailed in Enveng group's Preliminary Assessment (Enveng Group 2020). A copy of this report is provided in Appendix I:.

Because the ASS sampling was a secondary objective of the geotechnical investigation some minor deviations from DWER 2015 are noted including:

- Samples were not collected across the full depth profile of each sample location e.g. sampling did not extend past 1.25 mBGL which is not to the required 1 m below the maximum depth of disturbance
- Sampling densities were less than the recommended 2 samples per hectare for site's >20 ha

5.2 SOIL SAMPLING (JANUARY 2022)

Due to the size of the Site i.e. >20 ha, a reduced sampling density of 22 sample locations was applied with emphasis on investigating disturbance areas across high to moderate risk of ASS rather than a blanket sampling approach across the entire development envelope or at areas showing lower risk of ASS occurrence. Twenty-two sample locations were selected across the supratidal and intertidal zone of the Site and spaced to appropriately to be representative of the site geology which includes intertidal deposits, calcrete, colluvial gravel and weathered granophyre. Soil sample locations are shown on Figure 6 in Appendix D:.

At each location inspection and logging of the soil profile and collection of ASS samples at 0.25 m intervals from the surface of each sample site to one meter below the maximum depth of disturbance occurred with 165 primary samples collected in total.

Samples were collected in laboratory supplied plastic zip lock bags with air excluded and immediately placed into a chilled esky to minimise the potential for oxidation. Soil cores were segregated into 250mm sections with a minimum sample volume of 250 grams collected from each section. The samples were then transported under Chain of Custody (CoC) to a NATA accredited laboratory for analysis of ASS field and chemical parameters.

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Quality control in the form of duplicate samples were collected at a rate of at least 1:20 per primary sample for laboratory chemical testing. All duplicate samples were collected from the same sampling point as primary samples i.e. blind replicates. A total of seven duplicate samples were collected and five selected from 71 primary samples for laboratory testing chemical testing.

All samples were maintained under appropriate conditions where feasible and in accordance with AS 4482.1 and the DWER Acid Sulfate Soil Guideline Series during the transport to the laboratory with documentation of sample collection and under CoC protocols prior to submission to a NATA Accredited laboratory.

All primary samples were dispatched via air freight and road courier to ALS laboratory and secondary samples were forwarded to Eurofins MGT laboratories.

A total of 22 boreholes were drilled by direct push probe method or hand augered to a nominal depth of 3 mBGL or to refusal. The soil profile was logged in accordance with the United Soil Classification System (USCS) with samples collected at varying intervals from the surface of each sample site, (where possible). Soil profiles encountered during the drilling campaign are detailed in the logs provided in Appendix G: and below, and geological cross-sections as Figures 7A and 7B in Appendix D:.

A total of 165 primary samples were taken from 22 boreholes. The samples consisted of 165 ASS field samples. Of the 165 samples, 71 samples were selected for laboratory analysis for SPOCAS suite or S_{CR} suite with the details of the sampling regime summarised in Table E.

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Table E: Soil Investigation Methodology

Bore ID	Depth (m)	No. of investigative samples	SPOCAS or S_{CR} testing frequency	Duplicate collection	Duplicate testing
ASS1	3.0	13	4	-	
ASS2	0.3	2	0	-	
ASS3	0.9	5	2	-	
ASS4	1.3	6	2	-	
ASS5	0.9	5	2	3	2
ASS6	1.0	5	2	-	
ASS7	0.75	4	2	-	
ASS8	3.0	13	4	-	
ASS9	3.0	13	6	-	
ASS10	3.0	13	8	-	
ASS11	1.1	5	3	2	1
ASS12	3.0	13	5	1	1
ASS13	1.0	5	2	-	
ASS14	0.8	4	3	-	
ASS15	2.1	9	3	-	
ASS16	3.0	13	4	-	
ASS17	2.0	9	2	1	1
ASS18	2.7	11	5	-	
ASS19	0.6	3	1	-	
ASS20	2.1	9	3	-	
ASS21	0.25	2	1	-	
ASS22	2.0	9	3	-	

5.3 ACID SULFATE SOIL FIELD SCREENING

Acid Sulfate Soil field screening was conducted on 165 soil samples collected from 22 soil sample locations across the full vertical soil profile from ground surface to a nominal depth of 3 mBGL or to refusal. ASS field testing was conducted in general accordance with the DWER Acid Sulfate Soil Guidelines Series: *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes, 2015.* Soil samples were tested as follows:

- All 165 soil samples were prepared in a deionised water solution at the laboratory and measured for pH
- All 165 soil samples were prepared in a peroxide and sodium hydroxide solution and measured for pH

Field screening of the samples collected at 0.25 m intervals from ground surface to 1 m below maximum depth of disturbance allowed preliminary indication of depths at which ASS may be encountered and provided a basis for the selection of samples for quantitative laboratory testing (i.e. S_{CR} and SPOCAS testing, refer below). The specified testing suite is consistent with DWER requirements.

5.4 ACID SULFATE SOIL LABORATORY ANALYSIS

Laboratory analysis was undertaken to confirm the acidity potential of soil types at the site with samples selected for extended laboratory analysis following interpretation of initial field screening results. Samples were selected targeting soil profiles considered most likely to be representative of AASS and PASS based on the results of the field screening and to ensure adequate coverage of the soil profile or soil types was achieved.

The specified testing suite and sample quantities below are consistent with DWER requirements:

- Thirty samples in total, 27 primary and 3 duplicate samples were submitted for Suspension Peroxide Oxidation Combined Acidity and Sulfate (SPOCAS) tests
- Forty-seven samples in total, 45 primary and 2 duplicate samples were submitted for the Chromium Reducible Sulphur (S_{CR}) suite of analysis.

The laboratory analysis results (along with the preliminary field screening results) have been used to characterise areas where there is appreciable acidity present in the soil profile.

Laboratory test methods adopted for soil testing are outlined below. Explanations or definitions for various test methods adopted are taken from DWER 2015.

SPOCAS suite

As detailed in DWER's *Identification and investigation of acid sulfate soils and acidic landscapes* (2015), the SPOCAS method is a self-contained ABA test. The complete SPOCAS method provides 12 individual analytes (plus five calculated parameters), enabling the quantification of some key fractions in the soil sample, leading to better prediction of its likely acid-generating potential. It involves the measurement of pH, titratable acidity, sulfur and cations on two soil sub-samples. One soil sub-sample is oxidised with hydrogen peroxide and the other is not. The differences between the two values of the analytes from the two sub-samples are then calculated.

The Titratable Actual Acidity (TAA), the first part of the acid trail, provides a measure of the actual acidity (i.e. soluble and readily exchangeable acidity) within a soil sample. The Titratable Peroxide Acidity (TPA) measurement (the second part of the acid trail) is the net result of the reactions between the acidifying and neutralising components in the soil (following peroxide digestion). A TPA of zero indicates that for a finely-ground sample (under laboratory oxidation conditions), the soil's buffering/acid-neutralising capacity exceeds (or equals) the potential acidity from oxidation of sulfides. A valuable feature of the TPA peroxide digestion component of the SPOCAS method is that for soils with pH_{OX} >6.5, any excess acid neutralising capacity (ANCE) can be quantified by means of a hydrochloric acid titration. This feature is particularly useful when trying to confirm whether a soil has been treated with sufficient lime (including whether an appropriate liming safety factor has been applied, i.e. verification testing). The TPA, being a measure of net acidity, includes a contribution from the material's ANC.

Titratable Sulfidic Acidity (TSA) is calculated by TPA minus TAA.

The 'sulfur trail' of SPOCAS (i.e. S_{POS}) gives a measure of the maximum 'oxidisable' sulfur (usually predominantly sulfides) present in the soil sample. Since the chemical oxidising conditions employed in the laboratory are more rigorous than those experienced in the field, the S_{POS} result may, therefore, include some of the sulfur from the organic fraction in soil layers with appreciable organic matter. In such soil samples, S_{POS} is often slightly greater than chromium reducible sulfur (S_{CR}) (which specifically excludes organic forms of sulfur). Generally, S_{CR} and S_{POS} results are well correlated for redox-reduced or PASS samples but may differ on partially oxidised and surface samples.

In some ASS, S_{CR} or S_{POS} may be below the action limit but soils may still have an appreciable TPA. Sometimes this may reflect organic acidity, but it may also reflect acidity from oxidation and/or titration of iron-

containing or manganese-containing compounds. This is particularly the case in Western Australia for Bassendean Sands and coffee rock formations. Various aluminium containing compounds, or complexes, may also contribute to this acidity. This acidity may be present whether there is any appreciable potential sulfidic acidity (i.e. any significant S_{CR} or S_{POS} result). While this acidity is commonly not rapidly released into the environment in the short term, it is often released over a slower timeframe and so should not be dismissed as being of no consequence.

Chromium Reducible Sulfur Suite (S_{CR} Suite)

The chromium reducible sulfur suite is a set of independent analytical methods each of which determines a component of the Acid Base Accounting (ABA). Only specific components of the ABA are measured using this approach. The initial step in the chromium reducible sulfur suite is to measure the reduced inorganic sulfur content (by the chromium reducible sulfur (S_{CR}) method) to estimate the potential sulfidic acidity. Measurements of existing acidity and ANC are also made.

The chromium suite provides accurate, low-cost determination of (non-sulfate) inorganic sulfur and is not subject to significant interferences from sulfur, either in organic matter or sulfate minerals, e.g. gypsum, (Sullivan et al, 1999).

The inorganic sulfur compounds measured by this method are: i) pyrite and other iron disulfides; ii) elemental sulfur (SE); iii) thiosulfate, tetrathionate, polythionates; and iv), acid volatile sulfides (AVS), (e.g. greigite, mackinawite, amorphous FeS), provided these have not been lost during sample transport and preparation. When interpreting results, it should be noted that laboratories routinely oven-dry and grind samples, causing some or all the acid volatile sulfides to oxidise (Bush and Sullivan, 1997). Thus, the S_{CR} results reported for oven-dry samples may only contain a small proportion of the acid volatile sulfur that was present in the original wet sample. Except for specific depositional environments (e.g. drains and lake bottom sediments), this is not considered a significant issue as the surface content of most Australian ASS is generally dominated by pyrite.

On wet samples, the chromium reduction method can be made specific to the iron disulfide fraction if pre-treatments are used to remove the acid volatile sulfide and elemental sulfur fractions. Many sandy soils in the Swan Coastal Plain contain negligible acid-neutralising components but have appreciable amounts of TPA. In the absence of any appreciable amount of ANC, where TSA substantially exceeds the sulfidic acidity predicted from the sulfur trial (S_{POS}, S_{CR}), a precautionary approach should be adopted. This may be a risk if soils are only managed according to S_{CR} or S_{POS} values. In such circumstances, the application rate of neutralising materials should be increased to nearer that indicated when TSA is substituted into the ABA equation:

Net Acidity = potential acidity (TSA) + existing acidity – ANC

Acid Neutralising Capacity (ANC)

Acid neutralising capacity (ANC) is a measure of the soil's inherent ability to buffer acidity and resist the lowering of the soil pH. Acid buffering in the soil may be provided by dissolution of calcium and/or magnesium carbonates (e.g. shell or limestone), cation exchange reactions, and by reaction with the organic and clay fractions. The effectiveness of these buffering components in maintaining soil pH at acceptable levels (e.g. pH 6.5-9.0) will depend on the types and quantities of clay minerals in the soil, and on the type, amount and particle size of the carbonates or other minerals present.

6. GROUNDWATER SAMPLING PLAN

The groundwater assessment methodology is summarised in Table F. The groundwater investigation was undertaken in accordance with the following Tetra Tech SOPs:

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- Standard Operating Procedure: Groundwater monitoring well gauging
- Standard Operating Procedure: Groundwater sampling – low flow techniques.

Table F: Investigation Location Rationale

Activity	Details
Date of Activity	2021 (installation of groundwater monitoring wells), 8-10 February 2022 (groundwater monitoring event one), 21 February 2022 (groundwater monitoring event two)
Well Installation	All monitoring wells were installed with 4m of screen section positioned approximately 3 m below the static water level (SWL) and 1 m above with the remainder of the monitoring well-constructed with solid casing. Each bore was then backfilled with gravel to 1 m above the top of the screened interval. A minimum of 1m thick bentonite seal was then placed above this with the remainder of the bore being backfilled with clean soil cuttings and a concrete plug to surface. Wells were reinstated to ground level and finished with a steel monument. All wells were developed for approximately 15 – 20 minutes until turbidity was significantly reduced i.e. nearly clear. Coffey considers that development activities, which were undertaken in accordance with Coffey's relevant SOP, were sufficient to ensure that groundwater samples were representative of the aquifer formation Details of individual well installations are shown on the drilling logs in Appendix G:
Well Locations	The locations of the wells are presented on Figure 6
Well Survey	A well survey was completed and the details are provided in Table G
Well Gauging	The groundwater monitoring wells were gauged using an oil / water interface probe (IP) to measure the standing water level (SWL), potential presence of any light non-aqueous phase liquids (LNAPL) and end of well measurements. The IP was decontaminated between each monitoring well
Well Purging	Purging and collection of groundwater samples was undertaken using low flow sampling techniques (100 to 250 mL / minute sampling rate) to ensure drawdown is minimised (i.e. less than 0.1 m). Purging was conducted until water quality parameters (pH, dissolved oxygen (DO), oxidation/reduction potential, temperature, and electrical conductivity (EC)) stabilised (i.e. three consecutive measurements +/- 10%)
Sampling Method	Low-flow sampling equipment (peristaltic pump) was used to obtain groundwater samples from all monitoring wells with the tubing inlet positioned approximately 0.5m below the water table and where it was not practical to use the peristaltic pump, hand bailers were utilised instead. Collection of QC samples included three field duplicate and three field triplicate samples, collection of three equipment rinsate samples, three field blank (one per day of fieldwork) and one trip blank
Decontamination Procedure	All non-disposable sampling equipment (IP and water quality meter) were decontaminated with laboratory grade detergent and rinsed with scheme water between wells Dedicated nitrile gloves and tubing were used for each location
Waste Disposal	Purge water was returned or retained on site Solid waste such as tubing used for groundwater sampling was placed into off-site skip bins. Waste receipts showing disposal by an appropriately licensed contractor are provided in Appendix F:
Sample Preservation	Samples were collected in laboratory supplied bottles containing appropriate preservatives and immediately stored in an insulated cooler chilled with ice bricks upon sampling during air freight to the laboratory. Samples were submitted to the NATA accredited laboratory accompanied by COC documentation which is included in Appendix J:

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	Analysis of the primary samples (including field QC samples) was undertaken by ALS and triplicate samples by Eurofins. ALS and Eurofins are NATA accredited for the laboratory analyses performed
GME limitations	It is noted that total titratable acidity and total titratable alkalinity were not measured in the field during the GME. However, laboratory chemical testing of groundwater does include both Alkalinity (total as CaCO3) and Acidity (as CaCO3).

6.1 GROUNDWATER GAUGING

A round of groundwater gauging was undertaken on 8 February 2022 as part of a Groundwater Monitoring Event (GME) and following time to allow stabilisation of water levels and groundwater chemistry. Groundwater elevations range between -5.022 mAHD (MW04) in Site F to 2.746 mAHD (BH22) in Site C. to The results of groundwater gauging along with details of well construction and survey information are presented in Table G with groundwater contours presented on Figure 5 in Appendix D:.

Based on the gauging information and measured groundwater elevations presented, groundwater flow is toward the southwest in the Site C area and the northwest in the Site F area with eventual discharge shown to be into the Supratidal area with eventual discharge to King Bay to the west. The hydraulic gradient is shown to be reasonably gradual with water levels very close to surface within the supratidal areas and with surface waters in this area likely to be a surface expression of groundwater during high rainfall events.

Due to the heavy tidal influence in the area it is likely that groundwater flow directions will change and may reverse during periods of high tide. Groundwater well and tidal information is summarised in Table D and Table G.

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Table G: Groundwater well & Gauging Information

Well ID	Date Gauged	Easting (MGA 94 Zone 51)	Northing (MGA 94 Zone 51)	Total Depth (m)	Screened section (m)	Ground RL (mAHD)	Casing RL (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)
BH12	08/02/2022	476762.865	7718885.787	11.01	1.0-11.0	2.456	3.229	1.145	2.084
BH22	08/02/2022	476812.383	7719316.829	10.265	1.0-11.6	12.996	13.701	10.955	2.746
BH27	08/02/2022	476360.159	7718797.480	10.23	1.0-12.0	2.092	2.686	0.86	1.826
BH31	08/02/2022	476494.894	7718176.630	11.15	1.0-12.0	9.283	9.921	8.37	1.551
MW01	08/02/2022	476228.470	7719009.571	9.20	3.0-9.0	7.079	7.923	7.89	0.033
MW02	08/02/2022	476519.248	7718812.931	2.67	0.4-2.8	2.151	2.766	0.815	1.951
MW03	08/02/2022	476831.778	7718835.973	2.51	0.0-2.5	2.225	2.690	0.55	2.14
MW04	08/02/2022	476605.629	7717994.051	~21	12.0-21.0	15.830	16.588	21.61	-5.022
MW05	08/02/2022	476759.793	7718336.059	18.36	3.0-18.0	8.292	9.209	7.625	1.584
MW06	08/02/2022	476090.716	7718035.353	11.24	8.0-11.0	6.918	7.851	6.505	1.346
MW07	08/02/2022	476709.268	7718666.274	1.03	0.0-1.0	1.929	2.813	0.915	1.898
MW08	08/02/2022	476712.205	7718582.203	0.72	0.0-0.75	1.979	2.904	1.13	1.774
MW09	08/02/2022	476232.717	7718764.131	3.45	0.4-3.4	1.987	2.442	0.41	2.032
MW10	08/02/2022	476812.205	7718959.099	1.87	0.4-1.9	2.725	3.224	1.01	2.214

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7. ADOPTED ASSESSMENT CRITERIA

7.1 SOIL ASSESSMENT CRITERIA

7.1.1 ASS Field Assessment Criteria

Used as a proxy for the identification of ASS and sulfide content in Western Australia; all soil samples were analysed for ASS field parameters pH_F and pH_{FOX} (DER 2015).

Three factors require consideration in arriving at a positive identification for ASS based on field tests; these are:

- The strength of reaction with hydrogen peroxide (H_2O_2). Reaction strength can be categorised as low (L), moderate (M), high (H), extreme (X), or volcanic (V)
- The difference between field (pH_F) and peroxide (pH_{FOX}) measurements (ΔpH).
- The absolute values of pH_F and pH_{FOX}.

In addition to the above criteria, Table H presents the assessment criteria (DER, 2015) normally applied to assist in the preliminary identification of actual acid sulfate soils (AASS), potential acid sulfate soils (PASS) and/or non-acid sulfate soils (NASS).

Table H: Assessment Criteria for pH (DER, 2015)

Field pH Parameter	AASS	PASS
pH_F	<4	>4
pH_{FOX}	<4	<3

Tetra Tech has considered the DWER ASS guidelines for interpretation of results but has not solely relied on these guidelines to assess ASS because of unique site-based influences which can mislead or skew the interpretation of ASS data if adjustments are not made to screening criteria. The DWER guidelines are generally accurate for assessment of ASS in regions such as Perth and the south-west of Western Australia where typically an ASS field result will show actual acidity or potential acidity. However, in northern regions such as the Pilbara and Kimberley, coastal soils are generally influenced by variables such as buffering from the periodic inundation of soil from seawater, hypersaline soil and groundwater due to evapo-concentration of salts and complex hydrogeochemical processes including precipitation and dissolution of minerals which can influence the pH of soil with typical ASS field results recorded being >7 PH_F and pH_{FOX} >6. If criteria in Table H were applied without further testing i.e. SPOCAS or S_{CR} then most ASS samples would not show AASS or PASS, and ASS interpretation could be misled.

It is possible for Pilbara coastal soils to not show AASS or PASS but to have a relatively high sulfur content which generally correlates with potential acidity but the chemical reactions simulated by ASS field testing are effectively supressed by the buffering effects of seawater or armouring from hypersaline water supressing oxidation, and will not show acidity or potential acidity.

Considering investigation data from other sites in the Pilbara and the variation between Pilbara and Perth based soil and groundwater conditions, Tetra Tech has placed more emphasis on the observed reaction when H_2O_2 is added to soil and the calculated pH delta measured between pH_F and pH_{FOX}. And validation of field-based results is ultimately determined by laboratory based chemical testing through SPOCAS or S_{CR} analysis. Site specific ASS field assessment criteria are presented in Table I.

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Table I: Pilbara Region Assessment – Adopted Site Specific Criteria

Field pH Parameter	AASS	PASS	pH (Delta)	Observed Reaction
pH_F	<4	>7.0	1	Low, Moderate, High, Extreme, Volcanic
pH_{FOX}	<3	>6		

*(L) Low, (M) Moderate, (H) High, (X) Extreme, (V) Volcanic

7.1.2 Laboratory Analysis Assessment Criteria

Laboratory results were compared to the DER (2015) ASS 'Action Criteria'. Action Criteria represent the critical net acidity values (expressed in units of equivalent % pyrite sulfur, or equivalent mol H+ /t), for different soil texture groups and sizes of soil disturbance that trigger the need for ASS management as tabulated in Table J.

It is understood that soil disturbance will occur across the causeway and within the southern half of Site C requiring the excavation of >1,000 tonnes of soil, so for the purpose of this investigation the Action Criteria adopted is >1000 tonnes, medium texture soils and based on equivalent Sulfur of 0.03 %S. Samples exceeding this concentration are validated or confirmed as ASS and require management.

Table J: Texture Based ASS Action criteria

Type of Material		Action Criteria (<1000 tonnes)		Action Criteria (>1000 tonnes)	
		Existing & Potential Acidity		Existing & Potential Acidity	
Texture Range	Approx. Clay Content	Equivalent Sulfur	Equivalent Acidity	Equivalent Sulfur	Equivalent Acidity
	(%<0.002mm)	(%S)	(H+/tonne)	(%S)	(H+/tonne)
Coarse texture sands to loamy sands and peats	<5	0.03	18	0.03	18
Medium texture sandy loams to light clays	5 – 40	0.06	36	**0.03**	**18**
Fine texture medium to heavy clays and silty clays	>40	0.1	62	0.03	18

7.2 GROUNDWATER BENEFICIAL USES

Table K provides a summary of the potential beneficial uses of the aquifer to be protected according to the Water Resources Council Draft Policy and Principles, Protection of Waters from Pollution in Western Australia (WRC, 2004).

Table K: Summary of Protected Beneficial Uses and Likelihood of Use of Aquifer

Beneficial Uses	Likelihood of Groundwater Use	
	On Site	Off Site
Potable Water Supply	**Unlikely –** Based on current and adjacent site uses and high salinity of groundwater	**Unlikely –** No registered bores within 5 km of the site
Aquatic Ecosystems (Freshwater)	**Unlikely –** only ephemeral freshwater systems present on site, which are not seen to be in connection with groundwater.	**Unlikely –** only ephemeral freshwater systems in surrounding area and not thought to be in connection with groundwater, which only discharges in supratidal, marine area

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Beneficial Uses	Likelihood of Groundwater Use	
	On Site	Off Site
Aquatic Ecosystems (Marine Water)	**Likely –** Groundwater discharges to supratidal area with eventual discharge to King Bay.	**Likely –** eventual discharge of groundwater to King Bay, which may in turn affect coastal mangrove communities
Recreation and Aesthetics	**Unlikely –** Based on current site use	**Unlikely –** based on surrounding land use
Agriculture and Aquaculture	**Unlikely –** Based on current site use	**Unlikely –** Based on surrounding land use
Industrial/Commercial Use	**Unlikely –** Based on current site use	**Likely –** Based on types of industrial activities surrounding the site and evidence of groundwater abstraction for industrial purposes at adjacent Yara Nitrates site to east.

7.3 GROUNDWATER ASSESSMENT CRITERIA

Based on Table K, the highest beneficial groundwater use at the Site is for aquatic ecosystems (marine water) and offsite commercial /industrial usage.

On this basis, the adopted assessment criteria for groundwater are:

- ANZG (2018) Marine Water 95% LOSP Toxicant DGVs
- DWER ASS (2015)

7.3.1 DER ASS indicator criteria

The following criteria may indicate that the groundwater is being affected by the oxidation of sulfides.

- chloride: sulfate ratio of less than 2.0
- a pH of less than 5.0; and/or
- a soluble aluminium concentration greater than 1 mg/L.

In addition, the DER (2015) has developed indicative guidelines as to the buffering capacity of groundwater, based on a review of its alkalinity and pH, depicted in Table L below.

Table L: Assessment of the Buffering Capacity of groundwater

Class	Designation	Alkalinity (mg/L)	pH	Description
1	Very high alkalinity	>180	>6.5	Generally adequate to maintain acceptable pH level in the future
2	High alkalinity	60-80	>6.0	Generally adequate to maintain acceptable pH level in the future
3	Moderate alkalinity	30-60	5.5-7.5	Inadequate to maintain stable, acceptable pH level in areas vulnerable to acidification
4	Low alkalinity	10-30	5.0-6.0	Inadequate to maintain stable, acceptable pH level
5	Very low alkalinity	<10	<6.0	Unacceptable pH level under all circumstances

During dewatering monitoring programs, a target of 40 mg/L for acidity is used. This has been adopted as an indicator that groundwater that may require active treatment/ management.

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8. ACID SULFATE SOIL RESULTS & DISCUSSION

Acid sulfate soil samples were collected at 22 soil bore locations as shown in Figure 6 (Appendix D:.) Soil logs and supplementary geotechnical logs are included in Appendix G: and Appendix H:. Results of soil testing are presented in Table 1 and 2, Appendix C:. Laboratory Certificates of Analysis included in Appendix J:. A summary of the results is presented in Sections 9.1, 9.2 and 9.3, respectively.

8.1 SOILS DESCRIPTION

Twenty-two bore logs were recorded during site works from 24 to 31 January 2022 with logs showing four predominant soil types at investigation locations including sandy GRAVEL or clayey GRAVEL from 0-1.5 m in depth (red-brown in colour, poorly sorted, subangular to subrounded fragments of granophyre and calcrete within a sandy matrix), sandy CLAY from 0-1.5 m in depth (orange-brown, medium grained and moderately sorted with a silty clay matrix), CLAY from 0-2.0 m in depth (brown, high plasticity with fragments of calcrete), CALCRETE from 0.5-3.0 m in depth (rink-white, mottled, calcareous), and GRANOPHYRE from 0.25-12.0 m in depth (grey, fine crystalline texture, weathered and fractured in places, calcretised in places).

Geotechnical bore logs from Coffey's geotechnical report (2020) were also referenced where necessary to confirm or validate bore logs from the ASS investigation, and it was observed that shallow soils across the supratidal zone generally consisted of Clayey GRAVEL from ground surface or just below TOPSOIL to approximately 1.0 mBGL.

Copies of bore logs and supplementary geotechnical bore logs are attached to this report as Appendix G: and Appendix H:.

8.2 ASS FIELD PARAMETERS

A total of 165 primary soil samples were recovered and subject to field pH_F and pH_{FOX} testing and then compared to assessment criteria as shown in Table I. The pH_F results indicate the following acid generating characteristics of the soils present on-site as presented in Table M.

Table M: Field pH Parameters (pH_F and pH_{FOX})

Field pH Parameter	AASS	PASS*
pH_F	<4	>7.0
Samples %	0	100
pH_{FOX}	<3	>6.0
Samples %	0	99

- All pH_F values are greater than 4.0 (lowest value 7.6). The mean actual acidity was pH 8.71
- Potential acidity exists in approximately 75% of field samples with all samples showing a pH delta of >1
- Samples with lower pH_{FOX} were largely associated with red-brown clayey GRAVEL or clayey SAND
- No samples recorded a pH_F to pH_{FOX} change greater than 3.0
- Reactivity to field peroxide tests ranged from light to extreme but tended to be low to moderate where the pH delta was >2
- The preliminary ASS field test data does not suggest the presence of AASS onsite. However, PASS is likely to occur in most samples with varying degrees of potential sulfidic acidity.

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8.3 LABORATORY ASSESSMENT

Following the completion of field pH parameters, selected samples were submitted for extended analysis for SPOCAS and the S_{CR} suite to further assess the nature of acidic soils present on Site and provide an indication of the Net Acidity (Existing + Potential Acidity) present in the soil profile.

8.3.1 SPOCAS analysis

Twenty-seven samples in total were submitted for SPOCAS tests.

- Buffering/acid-neutralising capacity exists as indicated by the S-TPA net result in the soil profile across the site. All S-TPA results were reported below the laboratory limit of reporting (LOR) of <0.005%S
- No actual acidity exists in the form of S-TAA indicating that there is no soluble and exchangeable acidity within the soil profile. All S-TAA results were reported below the laboratory LOR of 0.005%S
- Analysis for maximum peroxide 'oxidisable' sulfur present in the soil (SPOS) exceeded DER ASS guidelines of 0.03 %S for nine samples, as displayed in Table N
- Highest net acidity (excluding ANC) was 0.39 %S at ASS6_1.0 (i.e. at a depth of 1.0 to 1.1 mBGL)
- Exceedances were identified in red-brown Clayey GRAVEL or SANDY GRAVEL, brown CLAY, brown-orange SAND soil horizons, in shallow surface soil between 0.0 mBGL to 0.75 mBGL

It is noted that due to the daily inundation of the supratidal area of Site C and the Causeway with seawater that the deposition of sulfate ions and soluble magnesium could possibly influence net acidity in soil samples tested using SPOCAS. When the tide rises and falls seawater is left to evaporate across the supratidal zone. Sulfate ions and magnesium crystalise on the ground surface and shallow surface soil can accumulate magnesium sulfate which can contribute to acidity in ASS samples. It is also possible that Net Acidity detected by SPOCAS analysis is organic in nature due to the accumulation of organic based materials on the ground surface across the supratidal zone.

Table N: SPOCAS Laboratory Exceedances

Laboratory Parameter	Samples exceeding guidelines	pH_{FOX}	DER ASS guideline %S	Result %S	mBGL	Approximate mAHD*
S_{POS}	ASS06_0.25	8.3	0.03	0.111	0.25	1.75
	ASS07_0.5	8.2		0.032	0.5	1.5
	ASS10_0.25	8.0		0.044	0.25	2.75
	ASS11_0.0	8.3		0.036	0.0	3
	ASS12_0.50	8.1		0.094	0.5	2.5
	ASS13_0.0	8.2		0.078	0.0	3
	ASS14_0.0	8.2		0.069	0.0	2
	ASS20_0.0	8.4		0.043	0.0	3
	ASS21_0.0	8.3		0.06	0.0	2

*AHD values have been approximately calculated using the survey points closest to the soil bore and LiDAR.

8.3.2 S_{CR} analysis

Forty-five primary samples were submitted for the S_{CR} suite of analysis. Each sample was split and S_{CR} was tested on both ground and unground portions of samples.

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- Measurement of reduced inorganic sulfur content (S_{CR}) to estimate potential sulfidic acidity shows two samples exceeding the DER ASS criteria of 0.03 %S below in Table O
- Highest net acidity was 0.341 %S (ASS06_1.0) at a depth of 1.0 mBGL
- Nine samples reported a detectable concentration of S_{CR} greater than the laboratory LOR (0.005 %S) at depths from 0.0 m and 2.5 mBGL
- Net acidity excluding ANC in ASS06_1.0 and ASS7_0.25 was reported >0.03 %S with correlates with S_{CR} results suggesting evidence of reduced inorganic sulfur
- Exceedances were identified in black-grey Clay and red-brown Sandy Gravel beneath the causeway area of the Site. The highest net acidity as associated with the black-grey Clay layer at a depth of approximately 1.0 mBGL

Table O: S_{CR} Laboratory Exceedances

Laboratory Parameter	Samples exceeding guidelines	pH_{FOX}	DER ASS guideline %S	Result %S	mBGL	Approximate mAHD*
S_{CR}	ASS06_1.0	5.9	0.03	0.341	1.0	1
	ASS07_0.25	6.3	0.03	0.035	0.25	1.75

*AHD values have been approximately calculated using the survey points closest to the soil bore and LiDAR.

8.4 CONCLUSIONS

No actual acidity exists in the form of S-TAA indicating that there is no soluble and exchangeable acidity within the soil profile. Potential acidity is present at the Site, due to 99% of soil samples displaying soil pH_{FOX} values greater than pH 6.0 with equivalent %S content between 0.032-0.341 %S. No samples recorded a pH_F to pH_{FOX} change or delta greater than 3.0 which amplifies potential acidity issues for the Site.

Analysis for the SPOCAS suite shows that generally soil has existing buffering/acid-neutralising capacity as indicated by all S-TPA results reported as non-detect (<0.005%S) and the soil containing excess ANC with % reported between 0.536%S to 19.3%S through the soil profile across the site. Analysis for maximum peroxide 'oxidisable' sulfur present in the soil (S_{POS}) exceeded the DER ASS guideline of 0.03 %S in nine samples. S_{CR} exceedances displayed evidence of reduced inorganic sulfur content in two samples.

Based on the analytical finding's the following statements apply:

- Soil located beneath the causeway from ground surface to ~1.0 mBGL is a PASS with evidence of reduced inorganic sulfur content in two samples.
- Soils located in proximity to sample locations ASS10, ASS11, ASS12, ASS13 and ASS14 have confirmed PASS with Net Acidity excluding ANC reported in ground surface samples and other samples collected to an approxmiate depth of 0.5 mBGL.
- The lateral extent of ASS is defined with surface samples at ASS20 and ASS21 reporting net acidity excluding ANC >0.04 %S.
- **Exceedances for S_{CR} were associated with red-brown clayey GRAVEL or grey-black and brown CLAYs between 0 and 1.0 mBGL across the causeway** (soil descriptions adopted from supplementary Geotechnical test pit logs)
- **Exceedances for the SPOS was associated with and red and brown clayey GRAVEL between 0.0 and 0.5 mBGL across the supratidal zone in Site C** (soil descriptions adopted from supplementary Geotechnical test pit logs)

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Figures 7A and 7B provide an interpretive cross-section of the underlying soil profile at the site and the associated depths of ASS requiring management or exceeding texture-based action criteria.

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9. GROUNDWATER RESULTS DISCUSSION

Groundwater results from the baseline monitoring event undertaken on 8 to 10 February are presented in Table 3 (Appendix C:). Groundwater was monitored and sampled at 14 monitoring bore locations as shown in Figure 6 (Appendix D:). Groundwater sampling forms are included in Appendix F: and Laboratory Certificates of Analysis are in Appendix J:. A summary of the results is presented in the following sections.

9.1 DEPTH TO WATER

Depth to water across the Site varied from 0.55 mBTOC at MW03 to 21.61 mBTOC at MW04. Recent investigations undertaken by Tetra Tech measured groundwater levels between 0.41 to 13.96 mBGL or 0.03 to 5.02 mAHD. Level survey data is presented below in Table P.

Table P: Level Survey Data

Well ID	Date Gauged	Easting (MGA 94 Zone 51)	Northing (MGA 94 Zone 51)	Total Depth (m)	Screened section (m)	Ground RL (mAHD)	Casing RL (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)
BH12	08/02/2022	476762.865	7718885.787	11.01	1.0-11.0	2.456	3.229	1.145	2.084
BH22	08/02/2022	476812.383	7719316.829	10.265	1.0-11.6	12.996	13.701	10.955	2.746
BH27	08/02/2022	476360.159	7718797.480	10.23	1.0-12.0	2.092	2.686	0.86	1.826
BH31	08/02/2022	476494.894	7718176.630	11.15	1.0-12.0	9.283	9.921	8.37	1.551
MW01	08/02/2022	476228.470	7719009.571	9.20	3.0-9.0	7.079	7.923	7.89	0.033
MW02	08/02/2022	476519.248	7718812.931	2.67	0.4-2.8	2.151	2.766	0.815	1.951
MW03	08/02/2022	476831.778	7718835.973	2.51	0.0-2.5	2.225	2.690	0.55	2.14
MW04	08/02/2022	476605.629	7717994.051	~22	12.0-21.0	15.830	16.588	21.61	-5.022
MW05	08/02/2022	476759.793	7718336.059	18.36	3.0-18.0	8.292	9.209	7.625	1.584
MW06	08/02/2022	476090.716	7718035.353	11.24	8.0-11.0	6.918	7.851	6.505	1.346
MW07	08/02/2022	476709.268	7718666.274	1.03	0.0-1.0	1.929	2.813	0.915	1.898
MW08	08/02/2022	476712.205	7718582.203	0.72	0.0-0.75	1.979	2.904	1.13	1.774
MW09	08/02/2022	476232.717	7718764.131	3.45	0.4-3.4	1.987	2.442	0.41	2.032
MW10	08/02/2022	476812.205	7718959.099	1.87	0.4-1.9	2.725	3.224	1.01	2.214

9.2 FIELD GROUNDWATER QUALITY PARAMETERS

Groundwater quality parameters measured post-purge during field GME activities conducted between 8 to 11 February 2022 are shown in Table Q with groundwater sampling forms presented in Appendix F:. It is noted that Dissolved Oxygen measurements are likely to be unrepresentative of site conditions as it was noted that the inlet to the flow through cell was leaking during sampling. Therefore, more reliance was placed on other parameters such as redox potential to ensure stabilisation of chemistry.

The following observations are noted:

- Reduction (redox) potential (Eh) measurements were seen to range from -68.6 mV to -169.2 mV within wells that were primarily screened within the granophyre bedrock showing predominantly reducing conditions. Within wells that were predominantly screened within the supratidal deposits, redox varied between 67.5 mV to 167.6 mV indicating significantly aerobic conditions, which will be a result of heavy aeration from significant interaction with the atmosphere and oxidised surface waters
- Electrical conductivity ranged from 5,206 µS/cm to 189,810 µS/cm indicative of brackish to hypersaline conditions. Brackish conditions are noted to exist within wells screened predominantly within the granophyre bedrock away from the supratidal areas whereas hypersaline conditions are noted within wells adjacent to or within the supratidal areas demonstrating a significant tidal influence
- pH measurements ranged from pH 6.56 to pH 7.76 indicating circum-neutral groundwater conditions
- Temperature measurements ranged from 28.7°C to 32.2°C with an average temperature of 25.7°C

Details on general site-specific hydrogeology are noted in Table Q.

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Table Q: Groundwater Physio-chemical Parameters

Well ID	Dissolved Oxygen (mg/L)	Electrical Conductivity (µS/cm)	pH (pH units)	Redox Potential (mV)	Temperature (°C)	Comments
BH22	0.3	7,469	7.21	-116.4	29.6	Black with organic odour
BH12	2.7	164,862	6.87	-111.8	29.9	Clear, No odour
BH27	94.2	189,810	6.77	67.5	29.3	Clear
BH31	89.2	7,111	7.74	-98.3	29.3	Cloudy, Slight organic odour
MW01	5.0	9,070	6.56	-169.2	28.7	Clear
MW02	77.1	176,602	7.05	115.7	32.2	Clear. No odour
MW03	13.2	119,910	7.51	94.1	30.2	Clear
MW04	Insufficient Sample – No data					
MW05	36.8	5,206	6.79	-112.4	29.4	Clear
MW06	84.0	5,184	6.98	-68.6	29.0	Clear. Slightly organic odour
MW07	94.4	185,223	7.08	167.6	31.0	Clear
MW08	97.4	145,038	7.15	93.4	29.3	Clear
MW09	20.3	141,662	6.84	77.2	29.5	Very cloudy, pale brown
MW10	17.1	8,607	7.76	67.8	31.4	Clear

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9.3 METALS AND METALLOIDS

Concentrations of soluble cadmium, chromium (III+VI), copper, lead, mercury were reported below laboratory LOR's. Concentrations of soluble arsenic, nickel and aluminium were reported above laboratory LORs but below adopted assessment criteria. Regarding other toxicants or metalloids, the following assessment criteria exceedances are noted.

- Soluble copper was reported at a concentration of 0.01 mg/L which exceeded the adopted assessment criteria of 0.0013 mg/L by a factor of 7.6
- Soluble iron was detected in three samples (BH12, BH22 and MW1) at concentrations ranging between 5.39 mg/L to 15.8 mg/L. All concentrations exceeded the adopted assessment criteria of 0.3 mg/L by factors of 28, 18 and 53 respectively
- Soluble manganese was detected in three samples (BH12, BH22 and MW1) at concentrations ranging between 5.74 mg/L to 17.4 mg/L. All concentrations exceeded the adopted assessment criteria of 5 mg/L by factors of 2.9, 1.1, 3.5 respectively
- Soluble zinc was reported at a concentration of 0.035 mg/L in MW6 which exceeded the adopted assessment criteria of 0.015 mg/L by a factor of 2.3
- Soluble magnesium concentrations ranged between 88 mg/L and 6,020 mg/L across the Site. Lower concentrations were generally reported outside of the supratidal zone i.e. MW10, and higher concentrations were observed in groundwater wells within the supratidal zone such as MW2.

9.4 ACID SULFATE SOIL WATER PARAMETERS

Dissolved aluminium was not detected over the DER ASS criteria of 1 mg/L at any location.

Total alkalinity (as $CaCO_3$) across the site ranged between 60 mg/L at MW02 and 563 mg/L at BH22 representing high to very high alkalinity (DER, 2015).

Calculated chloride:sulfate ratios were recorded above the DER ASS management criteria of <2 at all locations. DER guidelines advise that an elevated level of oxidised sulfate ions relative to chloride ions, is indication of possible presence of ASS in the landscape. A ratio of less than two, is a strong indication of an extra source of sulfate from previous sulfide oxidation (Mulvey, 1993).

9.5 NUTRIENTS

Regarding concentrations of major nutrients in groundwater the following results were reported. It is noted that ammonia was the only analyte to report exceedance of the adopted assessment criteria.

- Ammonia was detected in six samples (BH12, BH22, BH27, BH31, MW06, MW08, and MW08-2) with concentrations ranging between 0.07 mg/L to 9.19 mg/L, with two samples (BH22 and MW6) exceeding the adopted assessment criteria of 0.91 mg/L by factors of 4 and 10, respectively

9.6 MAJOR ANIONS & CATIONS

Baseline results indicate saline water beneath the site. Cation concentrations are generally consistent with salt water, with the ion of sodium, reported at concentrations up to 61,500 mg/L. The relatively high concentration of sodium is due to the inundation of the supratidal area with seawater daily. Slight acidification of groundwater was reported at many sample locations across the Site. Acidification of groundwater can often cause cations to leach out of the soil profile and be replaced by acidic elements (aluminium and hydrogen) dependant on cation exchange capacity (CEC) of the soils.

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Sulfate concentrations ranged between 14 mg/L and 8,050 mg/L across the Site. Lower concentrations were observed in groundwater wells outside of the supratidal zone such as MW01 and BH22. The highest concentrations of sulfate were reported in MW2 and MW8 at 7,270 mg/L and 8,050 mg/L respectively, which occur in the supratidal zone showing tidal influences.

9.7 CONCLUSIONS

Groundwater chemistry in the area generally indicates a hydrogeological system that has a low vulnerability to acidification in its undisturbed state.

ASS indicators that suggest minimal influence from historical acidification and a relatively low vulnerability to acidification include groundwater pH values within a neutral range across the site, low acidity values at most locations i.e. <40 mg/L, and high to very high alkalinity indicating some inherent buffering capacity is naturally present.

Dissolved aluminium is a key indicator of historical oxidation of sulfide minerals (i.e. pyrites) and was not detected in groundwater wells except at BH22 and MW10 with concentrations of 0.05 mg/L and 0.02 mg/L respectively. These minor detections are below ASS criteria.

The chloride:sulfate ratios complied with DER acidification guidelines across the site indicating a groundwater system that has not been affected by oxidation of sulfides.

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10. QUALITY ASSURANCE AND QUALITY CONTROL

10.1 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

The sampling and analysis was undertaken with reference to the DER (2015) *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes*. Strict hygiene procedures were applied throughout to assure sample integrity and quality.

Sampling equipment at each location was new and had not been used for sample collection previously. The equipment which came in to contact with any sample and was replaced between each sample location is as follows:

a) New push tubes were installed within the push probe casing
b) New casing caps were installed at the coring head
c) New disposable nitrile gloves were worn
d) New laboratory grade zip lock plastic bags were used for each sample collection.

All sample collection equipment was subject to cleaning procedures between each sampling location to prevent cross-contamination using the following procedure:

a) Remove adhered soils using scrapers, brushes and sponges
b) Wash thoroughly in an oxygen-based phosphate free detergent solution
c) Inspect equipment for any residues
d) Repeat (b) and (c) until no evidence of residues
e) Rinse thoroughly with water.

Each sample was placed directly into labelled clean laboratory prepared sample bags. The samples were immediately placed in an icepack chilled esky before being delivered (on the same day as collection) to the laboratory with an accompanying CoC.

Consistent with DER (2021) *Assessment and Management of Contaminated Sites,* quality control procedures included the collection and analysis of a duplicate for at least every twenty samples analysed, a daily rinsate and daily field blank (where required).

- A total of 165 primary soil samples were submitted for analysis of pH_F and pH_{FOX}. Five duplicates were also collected and submitted for analysis. As such, a total of 170 samples underwent field testing
- A total of 72 (primary) confirmatory ASS samples (SPOCAS & S_{CR}) were submitted for analysis. Five corresponding duplicates were also submitted for analysis. Therefore, a total of 77 samples were submitted for confirmatory laboratory analysis
- A total of 14 primary groundwater samples were submitted for analysis. Three duplicate and three triplicate samples were also taken, in addition to four rinsate blanks. A total of 24 samples were submitted for analysis.

10.2 LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

Tetra Tech requires that laboratories have a QA/QC program that is endorsed by NATA and meets the following criteria:

- All recovery rates to be between 75% and 125%
- Contaminant concentrations in rinsate samples to be at or below the nominated limits of detection

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- Relative percentage differences (RPDs) between original and duplicate samples to range between +/-50%. If the RPD is greater than +/-50%, the higher value is used for evaluation purposes.

Calculation of the RPD value is provided in the following equation:

$$RPD = \frac{(Co - Cs)}{\left(\frac{Co + Cs}{2}\right)} x100$$

where: Co = concentration of the original sample
Cs = concentration of the duplicate sample

The RPD calculation was used to normalise each pair of results to allow for better QA/QC data interpretation. For those RPD values which exceed a generally acceptable 30–50% (Standards Australia, 2005) data correlation is considered poor, however, consideration needs to be given to sample homogeneity and the concentrations detected.

Analytical data validation is the process of assessing whether data comply with method requirements and project specifications. The objective of this process is to ensure that data of known and predetermined quality are reported and identify if the data can be used to fulfil the overall project objectives.

In summary, the process involves the checking of analytical procedure and an assessment of the accuracy of analytical data from a range of standard QA/QC measures undertaken by both the sampler and the analytical laboratory.

The results of the QA/QC measures that were checked/assessed include the following:

- Preservation and storage of samples upon collection and during transport to the laboratory
- Holding times
- Use of appropriate analytical procedures
- Required limits of reporting, to ensure all lower quantifiable levels (LQL) are below the adopted guidelines
- Frequency of conducting quality control measurements
- Laboratory blanks
- Field duplicates and triplicates (RPD)
- Internal laboratory duplicates (RPD)
- Matrix spike (MS) (spike percentage recoveries (%R))

Results for laboratory QA/QC and assessment of laboratory duplicate results, including the calculation of RPDs for laboratory duplicates are detailed within laboratory Certificates of Analysis in Appendices D and E. Review of laboratory QA/QC results by Coffey personnel indicates that data confidence levels appear to fall within the acceptable tolerances.

10.3 QUALITY ASSURANCE AND QUALITY CONTROL EVALUATION

QA/QC evaluation undertaken by ALS Laboratory and QA/QC evaluation undertaken by Tetra Tech personnel in the field are detailed below.

10.3.1 Laboratory Soil Evaluation

All QAQC results for ASS parameters were satisfactory, with no outliers existing apart from several holding time non-compliances for ASS field samples i.e. pH_F and pH_{FOX}.

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Table R: Laboratory Soil QA/QC Evaluation

Requirement	Yes/No	Comments
All samples were extracted within the required holding time (HT)	Yes, with exceptions	ALS Lab Reports; EP2200878, EP2201074 and EP2201086 Holding time exceedances: • pH in Soil – All samples *Two to six days overdue for extraction*
Percentage recovery results were all within the acceptable range (dynamic recovery limits based on statistical evaluation of laboratory control spike) for all matrix spikes, laboratory control samples and surrogates for all analytes.	Yes	
All internal laboratory duplicates (randomly selected intra-laboratory splits) had relative percent differences (RPDs) within the acceptance criteria.	Yes	
Laboratory method blanks contained no detectable levels of analytes of interest.	Yes	
All laboratory LORs were below investigation levels (ILs).	Yes	

Data confidence levels are considered high and the data obtained is considered suitable to be used as a basis of ASS characterisation as there was no non-compliance with laboratory soil analysis.

10.3.2 Laboratory Groundwater Evaluation

Groundwater QA/QC laboratory results are presented in Table S.

Table S: Laboratory Groundwater QA/QC Evaluation

Requirement	Yes/No	Comments
All samples were extracted within the required holding time (HT)	Yes, with exceptions	ALS Lab Reports; EP2201691 and EP2202113 Holding time exceedances: • pH by PC Titrator – Ten samples (*Three to six*

		days, respectively overdue for extraction) • Ammonia as N by Discrete Analyser – seven samples (Four days)
Percentage recovery results were all within the acceptable range (dynamic recovery limits based on statistical evaluation of laboratory control spike) for all matrix spikes, laboratory control samples and surrogates for all analytes.	Yes, with exceptions	ALS Lab Reports; EP2201691 and EP2202113 Matrix spike recovery not determined for Sulfate as SO4 and Chloride - Two samples Matrix spike recovery not determined for Manganese - One sample
All internal laboratory duplicates (randomly selected intra-laboratory splits) had relative percent differences (RPDs) within the acceptance criteria.	Yes	
Laboratory method blanks contained no detectable levels of analytes of interest.	Yes	
All laboratory LORs were below investigation levels (ILs).	Yes	

Data confidence levels are considered high and the data obtained as part of the ASS investigation is considered suitable to be used as a basis of ASS characterisation of the proposed construction footprint.

10.3.3 Field Soil and Groundwater Evaluation

Precision of analytical techniques is measured by the RPD between duplicate results. In accordance with NEPM Schedule B3 (Section 3.5.1) (NEPM, 2013), if the RPD between duplicates is greater than 30%, a review should be conducted of the cause. RPD results are displayed in Tables 4 and 5 within Appendix C:.

SOIL

Laboratory Duplicates

Two RPD exceedances were reported for arsenic and chromium. Laboratory work order EP2200878 shows two analytes where the duplicate results exceeded the parent results by 66%.

Field Duplicates

An RPD exceedance is noted for the following sample:

Laboratory Report No. EP2201247

- ASS11_1.0/ QC7: sulfidic ANC RPD (66%)

A review of this exceedance shows that the primary sample concentration (0.919 %S) is higher than the associated duplicate concentration (0.463 %S) so the primary sample concentration has been adopted as a for assessment purposes.

GROUNDWATER

Laboratory Duplicates

Two RPD exceedances were reported for chromium and iron in laboratory work order EP2201691. Laboratory duplicate results for chromium show a duplicate concentration of 0.002 mg/L exceeding the parent concentration of 0.001 mg/L with a calculated RPD of 66%, and iron where the parent concentration of 0.12 mg/L exceeds the duplicate concentration of 0.06 mg/L with a calculated RPD of 66%.

Field Duplicates

RPD exceedances are noted for the following samples:

Laboratory Report No. EP2201691

- MW10/ QC1: Carbonate Alkalinity as $CaCO_3$ (156%)

Carbonate Alkalinity RPD exceedance shows a parent concentration of <1 mg/L which is less than the duplicate concentration of 8 mg/L. The higher of the two concentrations is generally adopted for assessment purposes however carbonate alkalinity was not assessed or used for assessment purposes so the RPD discrepancy is considered to have little bearing on data integrity. Comparison of Alkalinity (total as CaCO3) and the duplicate result shows an RPD of 1% which is within the acceptable range for reporting.

- MW10/ QC1: Ammonia as N (160%)

Ammonia as N RPD exceedance shows a parent concentration of <0.01 mg/L which is less than the duplicate concentration of 0.09 mg/L. The higher of the two concentrations is generally adopted for assessment purposes however on this occasion both reported concentrations are less than the adopted assessment criteria of 0.91 mg/L so are inconsequential to the assessment.

- MW08/ QC6: Nitrite as NO_2-N (100%)

Nitrite RPD exceedance shows a parent concentration of 0.06 mg/L which is higher than the associated duplicate concentration of 0.02 mg/L, so the primary sample concentration has been adopted for assessment purposes.

- MW08/ QC6: Total Kjeldahl Nitrogen (TKN) (67%)

Total Kjeldahl Nitrogen RPD exceedance shows a parent concentration of 4 mg/L which is higher than the associated duplicate concentration of 2 mg/L, so the primary sample concentration has been adopted for assessment purposes.

10.3.4 Blank quality control samples

No rinsate samples for the soil or groundwater sampling events exceeded the laboratory LOR. All blank analytical results are displayed in Table 5 within Appendix C:.

10.3.5 QA/QC Summary

After assessment of the field and internal laboratory quality control procedures and results, the integrity of the results for both the soil and groundwater investigation is upheld.

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11. CONCLUSIONS AND RECOMMENDATIONS

No actual acidity exists in the form of S-TAA indicating that there is no soluble and exchangeable acidity within the soil profile. Potential acidity is present at the Site, due to 99% of soil samples displaying soil pH_{FOX} values greater than pH 6.0 with equivalent %S content between 0.032-0.341 %S. No samples recorded a pH_F to pH_{FOX} change or delta greater than 3.0 which amplifies potential acidity issues for the Site.

Analysis for the SPOCAS suite shows that generally soil has existing buffering/acid-neutralising capacity as indicated by all S-TPA results reported as non-detect (<0.005%S) and the soil containing excess ANC with % reported between 0.536%S to 19.3%S through the soil profile across the site. Analysis for maximum peroxide 'oxidisable' sulfur present in the soil (S_{POS}) exceeded the DER ASS guideline of 0.03 %S in nine samples. S_{CR} exceedances displayed evidence of reduced inorganic sulfur content in two samples.

Soil located beneath the causeway from ground surface to ~1.0 mBGL is considered PASS, with evidence of reduced inorganic sulfur content in two samples. Soils located in proximity to sample locations ASS10, ASS11, ASS12, ASS13 and ASS14 have confirmed PASS with Net Acidity excluding ANC reported in ground surface samples and other samples collected to a depth of 0.5 mBGL. The lateral extent of ASS is defined with surface samples at ASS20 and ASS21 reporting net acidity excluding ANC >0.04 %S.

Exceedances for S_{CR} and SPOS, were associated with red-brown Clayey GRAVEL or Sandy CLAY, red-brown CLAY, and grey-black and brown CLAY between 0 and 1.0 mBGL across the causeway, and red-brown TOPSOIL, red-brown Sandy CLAY and GRAVEL between 0.0 and 0.5 mBGL across the supratidal zone in Site C.

Figures 7A and 7B provide an interpretive cross-section of the underlying soil profile at the site and the associated depths of ASS requiring management.

Groundwater chemistry in the area generally indicates a hydrogeological system that has a low vulnerability to acidification in its undisturbed state.

ASS indicators that suggest minimal influence from historical acidification and a relatively low vulnerability to acidification include groundwater pH values within a neutral range across the site, low acidity values at most locations i.e. <40 mg/L, and high to very high alkalinity indicating some inherent buffering capacity is naturally present.

Dissolved aluminium is a key indicator of historical oxidation of sulfide minerals (i.e. pyrites) and was not detected in groundwater wells except at BH22 and MW10 with concentrations of 0.05 mg/L and 0.02 mg/L respectively. These minor detections are below ASS criteria.

The chloride:sulfate ratios complied with DER acidification guidelines across the site indicating a groundwater system that has not been affected by oxidation of sulfides.

11.1 RECOMMENDATIONS

In accordance with condition no. 7.1 of MS1180 an ASS investigation was conducted in general accordance with (DER 2015) and ASS was identified as occurring within the supratidal zone of Site C and the causeway as detailed above. Noting that ASS was identified but disturbance is unlikely based on design plans provided and limited to no cut and fill within high to moderate risk ASS areas at the Site, ASS management is not required. However, if ASS are disturbed during the implementation of the proposal, the proponent shall treat and manage ASS in accordance with the requirements of the (DER 2015).

The following management recommendations are proposed to comply with condition no. 7.2 of MS1180 in the event of ASS disturbnace.

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1. If disturbance of >1,000 tonnes of ASS occurs at the causeway or Site C then soil should be treated at the reported maximum Net Acidity of 0.39 %S. Based on the Net Acidity, a safety factor of 1.5 and an ENV of 91.5% (Aglime of Australia Product information Sheet, 2022) a calculated liming rate of 19.95 kg/tonne should be adopted for neutralisation of ASS
2. If disturbance of <1,000 tonnes of ASS occurs with stockpiling at the causeway or Site C then soil can be stockpiled for up to 70 hours before soil has to be neutralised. If soil is to be stockpiled longer than 70 hours then a risk assessment will be required and additional management measures such as leachate capture and periodic application of lime to neutralise acidity
3. For all stockpiling, a guard layer of crushed limestone should be used to protect underlying soils. The guard layer should also include a bund around the guard layer to contain any surface runoff in the event of rainfall. The base of the guard layer or treatment pad should be at least 300 mm thick with 150mm high bund walls to contain treated soils and any effluent associated with direct rainfall on stockpiles
4. For all ASS neutralisation, soil validation sampling should be conducted in accordance with (DER 2015) to ensure effective treatment and neutralisation of ASS. If soil validation sampling fails then soils should be retreated and re-validated until results show Net Acidity <0.03 %S
5. If a need for dewatering is identified during planning then a dewatering management plan (DMP) should be prepared to manage potential impacts of development works that have potential to disturb ASS materials onsite.

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12. REFERENCES

- Cardno (2020) Perdaman Urea Project, Surface Water Management Plan, March 2020. Ref No: CW1055600-EN-PL-002
- Cardno (2020) Perdaman Urea Project, Environmental Review Document, March 2020. Ref No: Rev 3.1
- Coffey (2020) Perdaman Urea Geotechnical Investigation, Interpretive Report, November 2020. Ref No: 754-PERGE271567-R06 Rev1
- Department of Environmental Regulation (DER) (2015) Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes. Ref: DER2015001427
- Department of Environmental Regulation (DER) (2015) Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes. Ref: DER2015001427
- Enveng Group (2020) Perdaman Environmental Testing and Acid Sulfate Soils (ASS) Preliminary Assessment – Summary of Findings and Recommendations. Ref No. PR25
- NEPC (2013) National Environment Protection (Assessment of Site Contamination) Measure (NEPM) (Schedule B1): Guideline on Investigation Levels for Soil and Groundwater. National Environmental Protection Council
- NEPC (2013b) National Environment Protection (Assessment of Site Contamination) Measure (NEPM) (Schedule B2): Guideline on Data Collection, Sample Design and Reporting. National Environmental Protection Council
- NEPC (2013c) National Environment Protection (Assessment of Site Contamination) Measure (NEPM) (Schedule B3): Guideline on Laboratory Analysis of Potentially Contaminated Soils. National Environmental Protection Council

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APPENDIX A: STATEMENT OF LIMITATIONS

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IMPORTANT INFORMATION ABOUT YOUR TETRA TECH COFFEY ENVIRONMENTAL REPORT

Introduction

This report has been prepared by Tetra Tech Coffey for you, as Tetra Tech Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice.

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Tetra Tech Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Tetra Tech Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Tetra Tech Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Tetra Tech Coffey should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Tetra Tech Coffey would be pleased to assist with any investigation or advice in such circumstances.

Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Tetra Tech Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Tetra Tech Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Tetra Tech Coffey prepared the report and has familiarity with the site, Tetra Tech Coffey is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Tetra Tech Coffey disowns any responsibility for such misinterpretation.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.

APPENDIX B: CERTIFICATES OF TITLE

DRAFT

REGISTER NUMBER	
700/DP411759	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
1	**24/3/2022**

WESTERN AUSTRALIA

VOLUME **4017** FOLIO **305**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

LAND DESCRIPTION:

LOT 700 ON DEPOSITED PLAN 411759

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

WESTERN AUSTRALIAN LAND AUTHORITY OF LEVEL 2 40 THE ESPLANADE PERTH WA 6000
(TF P081162) REGISTERED 18/3/2022

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. L596014 EASEMENT TO WATER CORPORATION FOR WATER PIPES WATER MAINS PURPOSES. SEE DEPOSITED PLAN 411759. REGISTERED 6/4/2011.
2. *O604891 NOTIFICATION OF EASEMENT FOR PIPELINE PURPOSES PURSUANT TO SECTION 19(4) OF THE PETROLEUM PIPELINES ACT 1969 TO SANTOS WA NORTHWEST PTY LTD OF LEVEL 7 100 ST GEORGES TERRACE PERTH WA 6000, HARRIET (ONYX) PTY LTD OF LEVEL 9 191 ST GEORGES TERRACE PERTH WA 6000. AS TO PORTION ONLY - SEE DEPOSITED PLAN 411759. RECORDED 7/1/2021.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP411759
PREVIOUS TITLE:	LR3174-526
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	CITY OF KARRATHA
RESPONSIBLE AGENCY:	WESTERN AUSTRALIAN LAND AUTHORITY

NOTE 1: N059155 DEPOSITED PLAN 406079 LODGED (INTEREST ONLY)

REGISTER NUMBER	
701/DP411760	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
1	**24/3/2022**

WESTERN AUSTRALIA

VOLUME **4017** FOLIO **306**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

LAND DESCRIPTION:

LOT 701 ON DEPOSITED PLAN 411760

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

WESTERN AUSTRALIAN LAND AUTHORITY OF LEVEL 2 40 THE ESPLANADE PERTH WA 6000
(TF P081162) REGISTERED 18/3/2022

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP411760
PREVIOUS TITLE:	LR3174-532
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	CITY OF KARRATHA
RESPONSIBLE AGENCY:	WESTERN AUSTRALIAN LAND AUTHORITY

REGISTER NUMBER	
472/DP220595	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
N/A	**N/A**

WESTERN AUSTRALIA

VOLUME	FOLIO
LR3111	**931**

RECORD OF QUALIFIED CERTIFICATE OF CROWN LAND TITLE

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE OF WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts
REGISTRAR OF TITLES

LAND DESCRIPTION:

LOT 472 ON DEPOSITED PLAN 220595

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE VESTED UNDER STATUTE

PRIMARY INTEREST HOLDER: PILBARA PORTS AUTHORITY OF LEVEL 3/16 PARLIAMENT PLACE WEST PERTH WA 6005

(XE N501246) REGISTERED 5/12/2016

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. H377740 RESERVE 41636 FOR THE PURPOSE OF PORT PURPOSES REGISTERED 1/3/2000.
2. J531447 CAVEAT BY TELSTRA CORPORATION LTD AS TO PORTION ONLY. LODGED 1/12/2005.
3. N161577 CAVEAT BY TELSTRA CORPORATION LTD AS TO PORTION ONLY LODGED 29/10/2015.
4. N501246 VESTED. PURSUANT TO SECTION 25 OF THE PORT AUTHORITIES ACT 1999 REGISTERED 5/12/2016.
5. N657895 LEASE TO WESTERN AUSTRALIAN LAND AUTHORITY OF LEVEL 6 40 THE ESPLANADE PERTH WA 6020 EXPIRES: SEE LEASE. AS TO PORTION ONLY - SEE DEPOSITED PLAN 410657. REGISTERED 27/6/2017.
   N657897 SUB-LEASE OF LEASE N657895 TO YARA PILBARA FERTILISERS PTY LTD OF LEVEL 5 182-184 ST GEORGES TERRACE PERTH WA 6000 EXPIRES: SEE SUB LEASE. AS TO PORTION ONLY - SEE DEPOSITED PLAN 410663. REGISTERED 27/6/2017.
6. O440477 LEASE TO TELSTRA CORPORATION LIMITED OF CARE OF JONES LANG LASALLE LEVEL 10 242 EXHIBITION STREET MELBOURNE VIC 3000 EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 2/7/2020.

Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.
(2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.
(3) The interests etc. shown hereon may have a different priority than shown.

END OF PAGE 1 - CONTINUED OVER

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----------END OF CERTIFICATE OF CROWN LAND TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP220595
PREVIOUS TITLE:	LR3098-837
PROPERTY STREET ADDRESS:	LOT 472 MOF RD, BURRUP.
LOCAL GOVERNMENT AUTHORITY:	CITY OF KARRATHA
RESPONSIBLE AGENCY:	PILBARA PORTS AUTHORITY

NOTE 1:	A000001A	SUBJECT TO SURVEY - NOT FOR ALIENATION PURPOSES
NOTE 2:	M561807	DEPOSITED PLAN 401584 LODGED.
NOTE 3:	N501245	CORRESPONDENCE FILE 00532-1991-05RO

LANDGATE COPY OF ORIGINAL NOT TO SCALE 25/02/2022 03:04 PM Request number: 63250502
www.landgate.wa.gov.au

Plan Information

Tenure Type	Crown
Plan Type	Deposited Plan
Plan Purpose	Subdivision

Plan Heading

LOTS 700, 702-705 AND 707

Locality and Local Government

Locality	BURRUP
Local Government	CITY OF KARRATHA

Planning Approval

Exempt

Department of Planning, Lands and Heritage

File Number	L00272-2018

Survey Details

Survey Method	Conventional Survey
Field Records	139951
Declared as Special Survey Area	No

Survey Method and Plan Content Variations

Approved Variation Type	Reference
Exemption - Regulations39 & 49 No requirement for placement of intermediate marks and undertaking trenching (stone pointers) under Regulation 26A (1).	Approval ID S1-22; Landgate file 06909-2021

Survey and plan notation

Reg. 26A (1) - Exemption to the requirements of Regulation 39 and 49 of the Licensed Surveyors (General Surveying Practice) Regulations 1961.
(Approval ID S1-22) dated 31 January 2022; Landgate file 06909-2021.

Survey Certificate - Regulation 54

I hereby certify that this plan is accurate and is a correct representation of the:
(a) * survey; and/or
(b) * calculations and measurements;
[* delete if inapplicable]
undertaken for the purposes of this plan and that it complies with the relevant written law(s) in relation to which it is lodged.

R.G.Agnew Digitally signed by R.G.Agnew Date: 2022.02.25 10:01:14 +08'00'

ROBERT GORDON AGNEW Licensed Surveyor	Date

Survey Organisation

Name	AGNEW & MACHIN
Address	PO BOX 22 FLOREAT 6014
Phone	93839991
Fax	
Email	agnew.robert@gmail.com
Reference	2364/21

Amendments

Version	Lodgement Type	Amendment Description	Date
1	New Plan	Lodged	22/02/2022
2	Amendment Plan	Plan Examination Requirements	

Former Tenure

New Lot / Land	Parent Plan Number	Parent Lot Number	Title Reference	Parent Subject Land Description
704-705	DP42282	PT LOT 3015	LR3139-38	
703, 707	DP42282	PT LOT 3012	LR3139-35	
700	DP42282	PT LOT 3012	LR3139-35	
	DP42282	PT LOT 3015	LR3139-38	
	DP42282	PT LOT 3016	LR3139-39	
702	DP42282	PT LOT 3016	LR3139-39	

Former Tenure Interest and Notifications

Subject	Former Tenure	Action	Lots On This Plan	Origin	Endorsement	Comments
(Y)	3015/DP42282	Brought forward (in full)	LOTS 700, 704-705	DOC O604891	NOTIFICATION OF EASEMENT FOR PIPELINE PURPOSES PURSUANT TO SECTION 19(4) OF THE PETROLEUM PIPELINES ACT 1969 TO SANTOS WA NORTHWEST PTY LTD OF LEVEL 7 100 ST GEORGES TERRACE PERTH WA 6000, HARRIET (ONYX) PTY LTD OF LEVEL 9 191 ST GEORGES TERRACE PERTH WA 6000. AS TO PORTION ONLY - SEE DEPOSITED PLAN 51732 RECORDED 7/1/2021.	
(X)	3015/DP42282	Brought forward (in full)	LOTS 700, 704-705	DP42282,DOC L596014	EASEMENT TO WATER CORPORATION FOR WATER PIPES WATER MAINS PURPOSES. SEE DEPOSITED PLAN 51731 REGISTERED 6/4/2011.	

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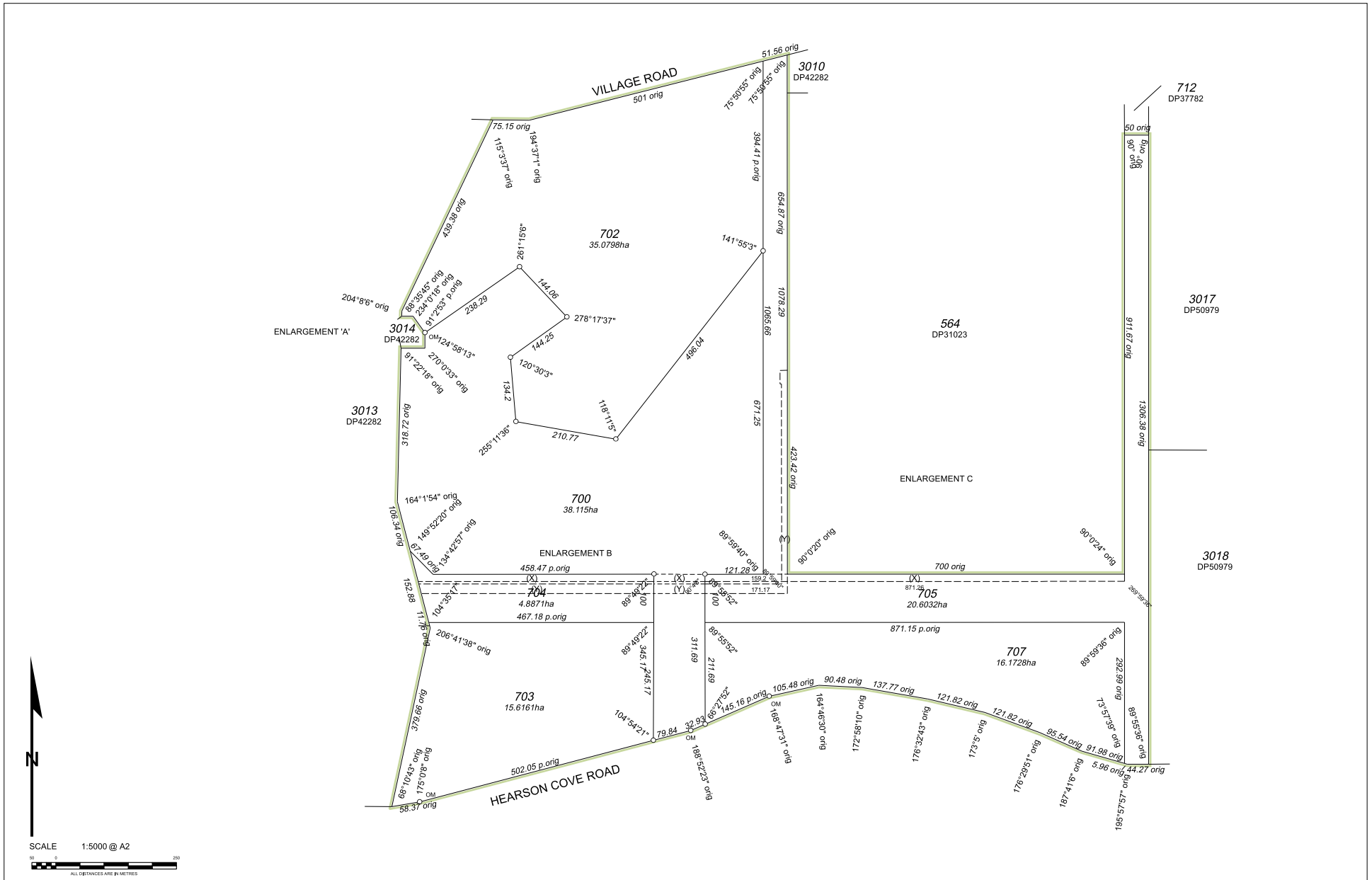

ADDITIONAL SHEETS	SHEET		SHEETS	VERSION NUMBER	DEPOSITED PLAN
ENDORSEMENT SHEET	2	OF	5	2	411759

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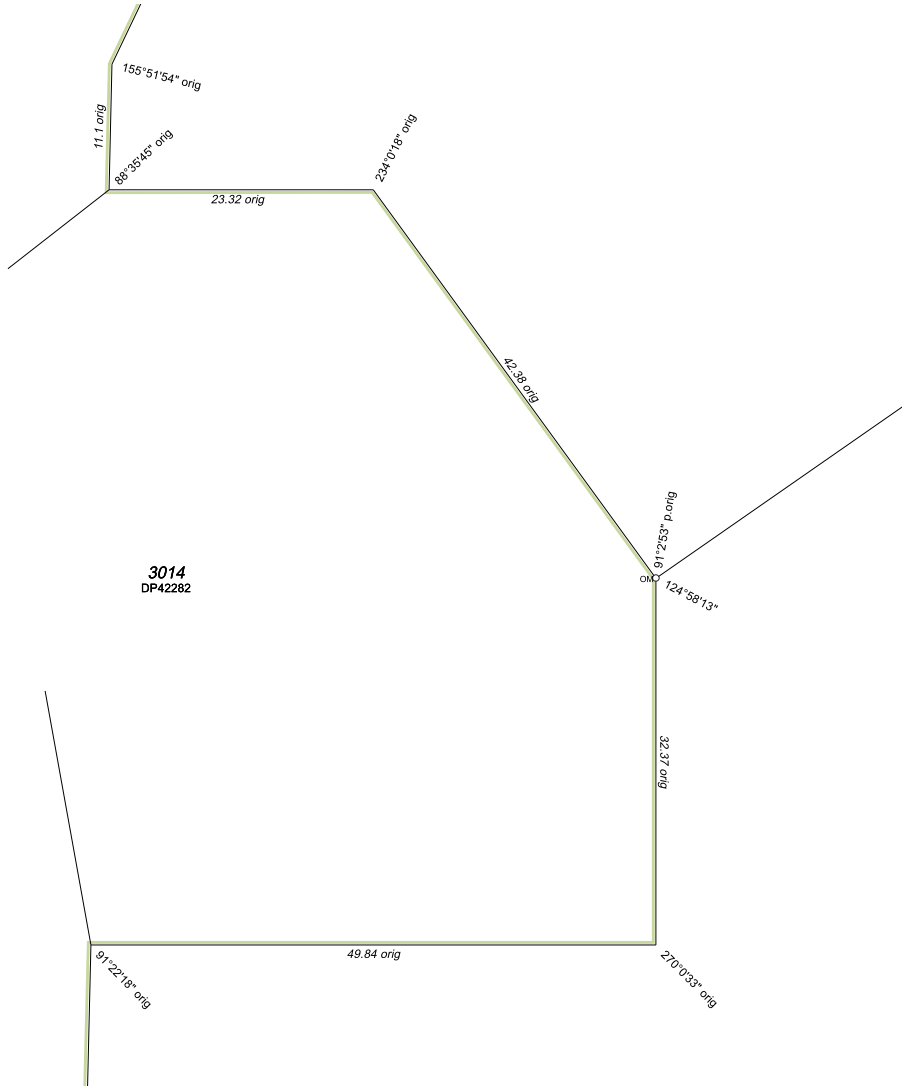

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SCALE 1:300 @ A2

5 0 15

ALL DISTANCES ARE IN METRES

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LICENSED AND ENGINEERING SURVEYORS
PO BOX 33 FLOREAT WA 6014
T 9383 9991 M 0419 849 430
E agnew.robert@gmail.com

ADDITIONAL SHEETS	SHEET		SHEETS	VERSION NUMBER	DEPOSITED PLAN
ENDORSEMENT SHEET	3	OF	5	2	411759

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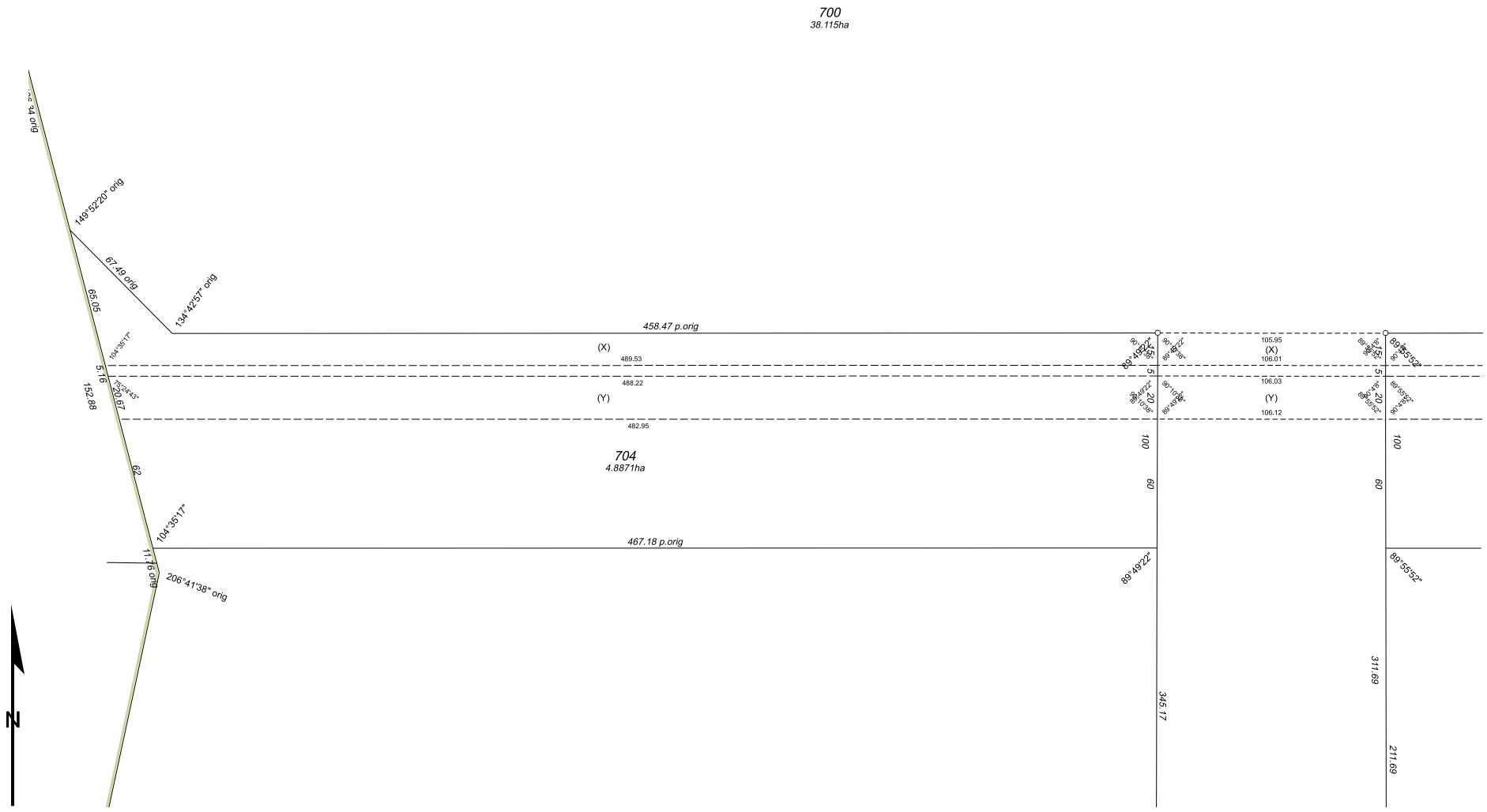

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ALL DISTANCES ARE IN METRES

ADDITIONAL SHEETS	SHEET		SHEETS	VERSION NUMBER	DEPOSITED PLAN
ENDORSEMENT SHEET	4	OF	5	2	411759

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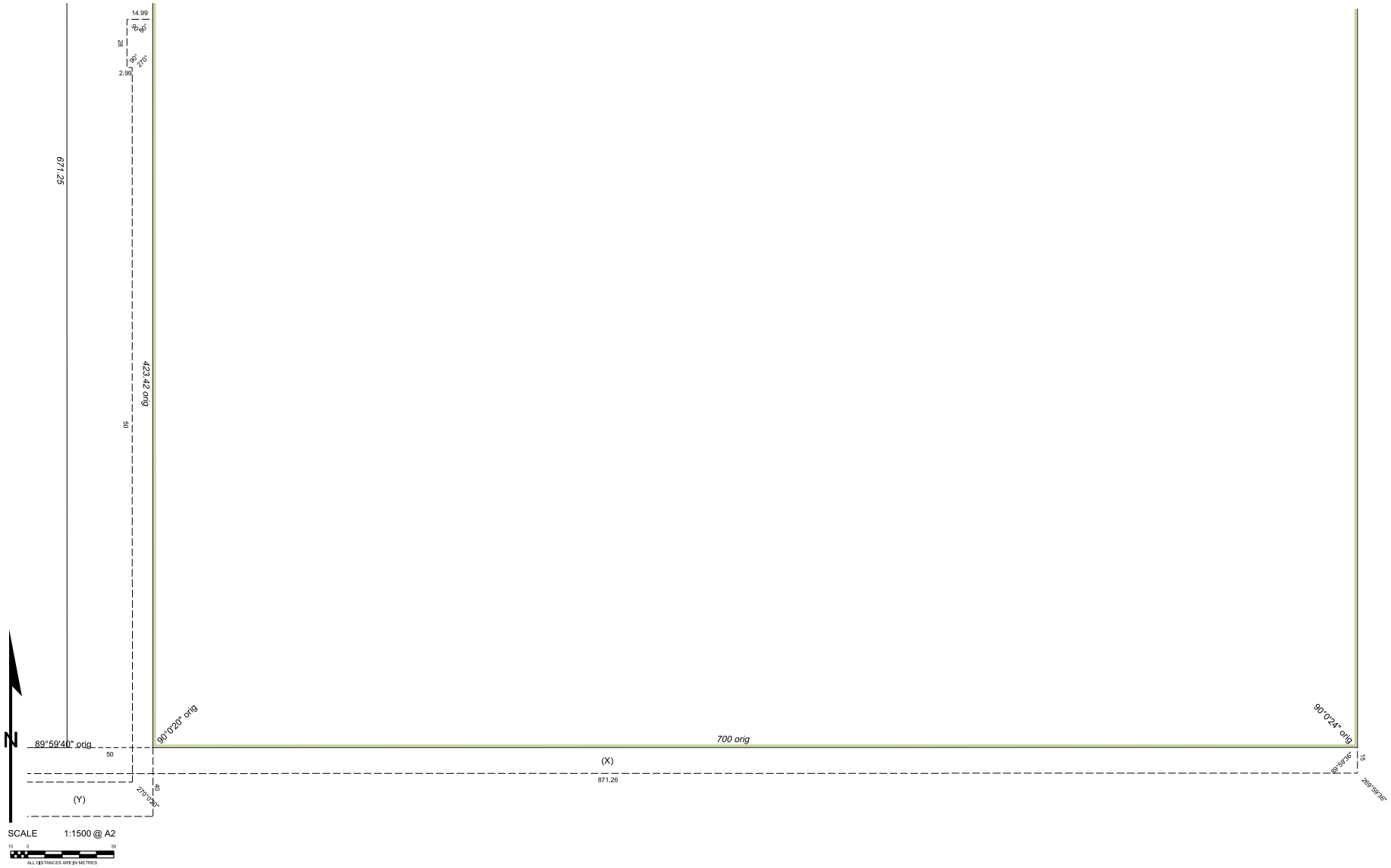
ENLARGEMENT C



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ADDITIONAL SHEETS	SHEET		SHEETS	VERSION NUMBER	DEPOSITED PLAN
ENDORSEMENT SHEET	5	OF	5	2	411759

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Lodgement and Examination

Lodgement Date	22/02/2022
Version 2 Submission Date	25/02/2022
Examination Date	25/02/2022

Western Australian Planning Commission

Planning Approval	Exempt
Reference	

In Order For Dealings

Subject To

For Inspector of Plans and Surveys / Authorised Land Officers	Date 25.2.2022

Plan Approved

Inspector of Plans and Surveys / Authorised Land Officer	Date

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www.landgate.wa.gov.au

Plan Information

Tenure Type	Crown
Plan Type	Deposited Plan
Plan Purpose	Subdivision

Plan Heading

LOTS 701, 706 AND 708-709

Locality and Local Government

Locality	BURRUP
Local Government	CITY OF KARRATHA

Planning Approval

Exempt

Department of Planning, Lands and Heritage

File Number	L00272-2018

Survey Details

Survey Method	Conventional Survey
Field Records	139951
Declared as Special Survey Area	No

Survey Method and Plan Content Variations

Approved Variation Type	Reference
Exemption - Regulations 39 and 49 of the Licensed Surveyors (General Surveying Practice) Regulations 1961. (Approval ID S1-22) dated 31 January 2022; Landgate file 06909-2021.	Approval S1-22; Landgate file 06909-2021
Reg. 26A (1) - Exemption to the requirements of Regulations 36 and 37 of the Licensed Surveyors(General Surveying Practice) Regulations 1961, for boundaries between and including A-B, C-D and E-F-G-H-E. (Approval ID S3-22) dated 22 February 2022.	Approval S3-22; Landgate file 06909-2021.

Survey and plan notation

Reg. 26A (1) - Exemption to the requirements of Regulations 39 and 40 of the Licensed Surveyors (General Surveying Practice) Regulations 1961. (Approval ID S1-22) dated 31 January 2022: Landgate file 06909-2021.

Survey Certificate - Regulation 54

I hereby certify that this plan is accurate and is a correct representation of the:
(a) * survey; and/or
(b) * calculations and measurements;
[* delete if inapplicable]
undertaken for the purposes of this plan and that it complies with the relevant written law(s) in relation to which it is lodged.

R.G.Agnew Digitally signed by R.G.Agnew Date: 2022.03.03 07:03:55 +08'00'

ROBERT GORDON AGNEW Licensed Surveyor	Date

Survey Organisation

Name	AGNEW & MACHIN
Address	PO BOX 22 FLOREAT 6014
Phone	93839991
Fax	
Email	agnew.robert@gmail.com
Reference	2364/21

Amendments

Version	Lodgement Type	Amendment Description	Date
1	New Plan	Lodged	23/02/2022
2	Replacement Plan	Former tenure amended	01/03/2022
3	Replacement Plan	Amendments requested by examination	02/03/2022
4	Replacement Plan	Amendments requested by examination	

Former Tenure

New Lot / Land	Parent Plan Number	Parent Lot Number	Title Reference	Parent Subject Land Description
706	DP406755	PT LOT 556	LR3167-961	
708	DP406755	PT LOT 553	LR3167-958	
	DP406755	PT LOT 557	LR3167-962	
709	DP406755	PT LOT 557	LR3167-962	
701	DP406755	PT LOT 553	LR3167-958	
	DP406755	PT LOT 556	LR3167-961	
	DP406755	PT LOT 557	LR3167-962	

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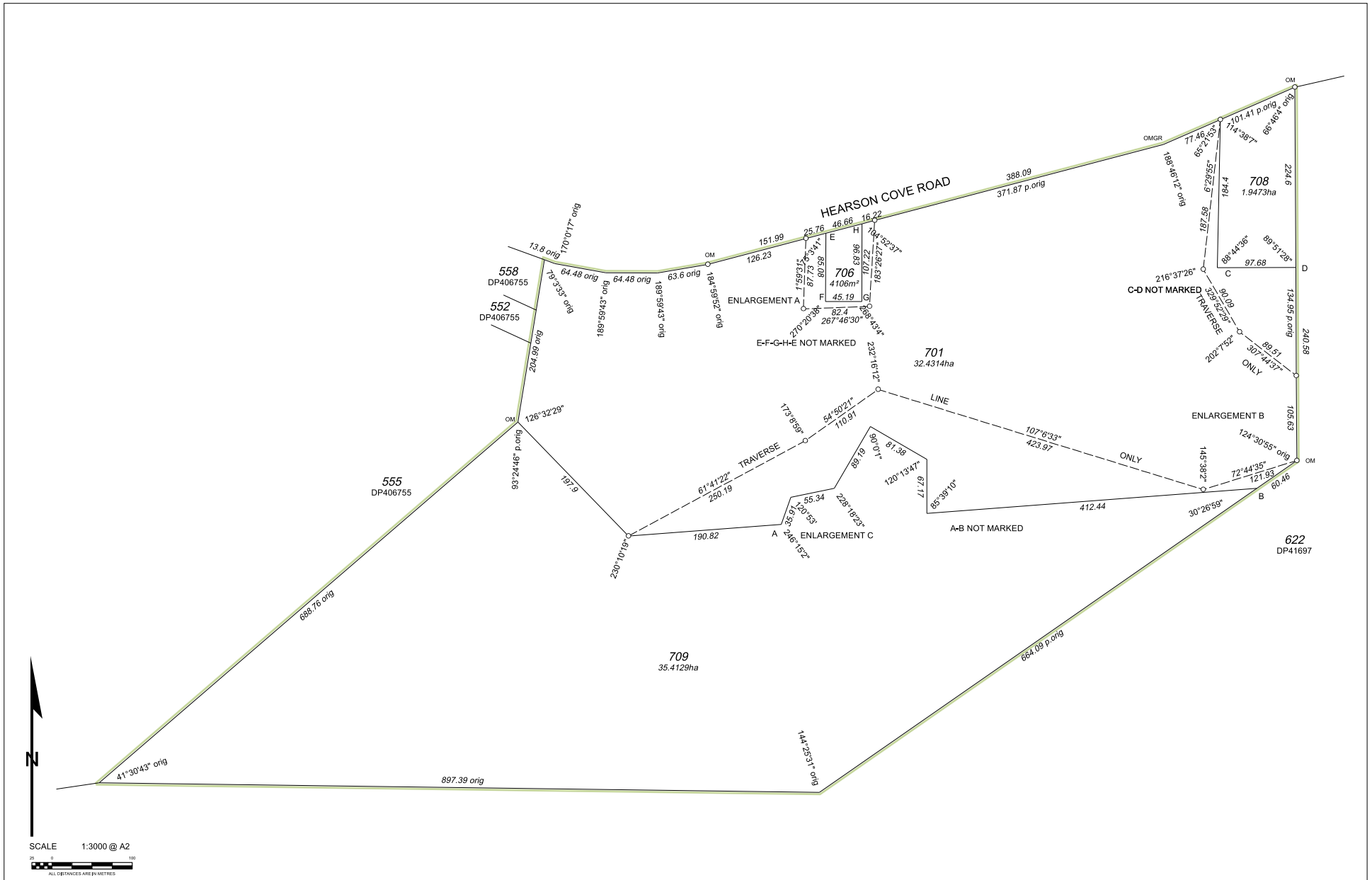

Landgate	AGNEW + MACHIN PTY LTD LICENSED AND ENGINEERING SURVEYORS	ADDITIONAL SHEETS ENDORSEMENT SHEET	SHEET 2 OF SHEETS 5	VERSION NUMBER 4	DEPOSITED PLAN 411760

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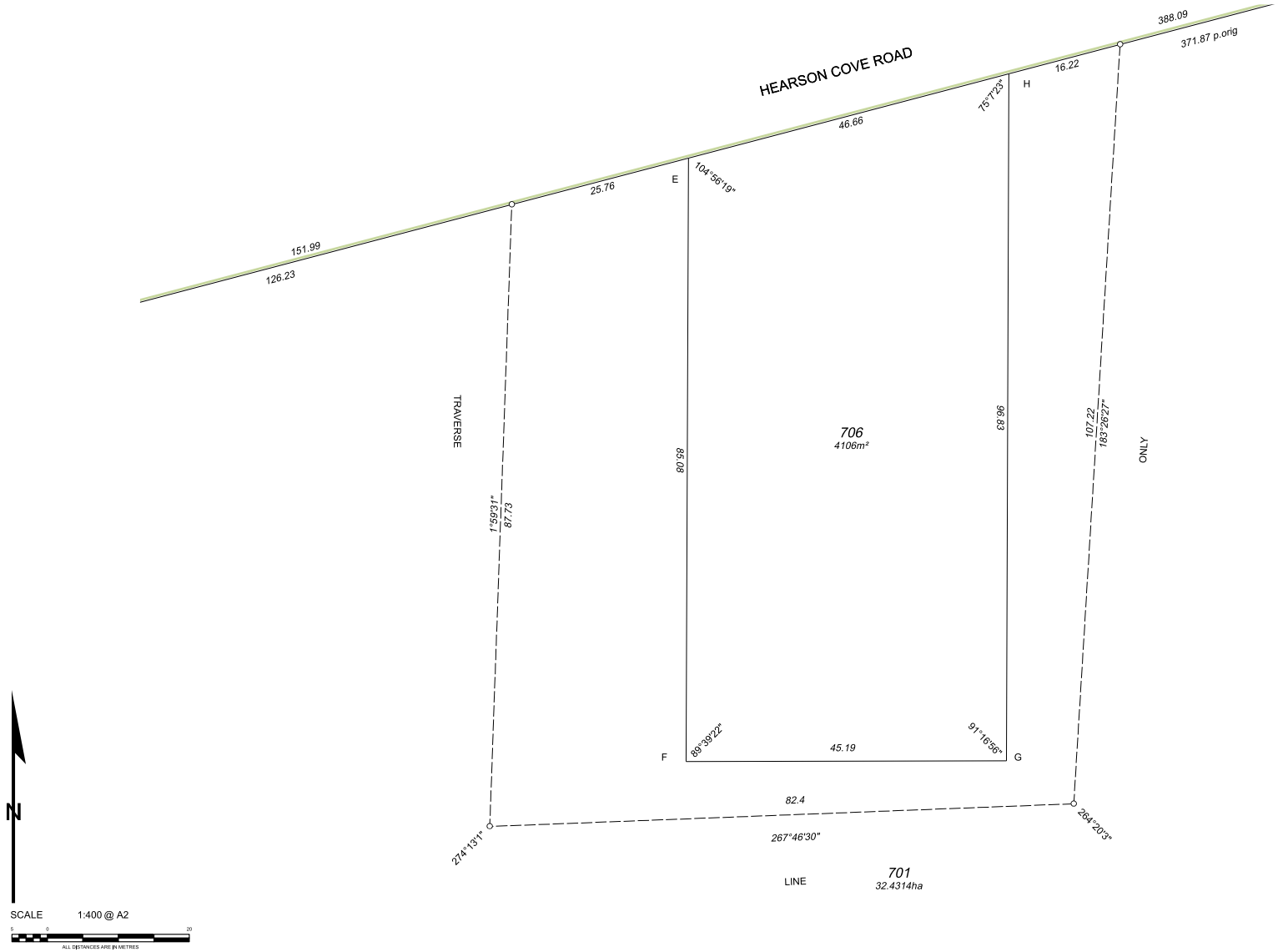
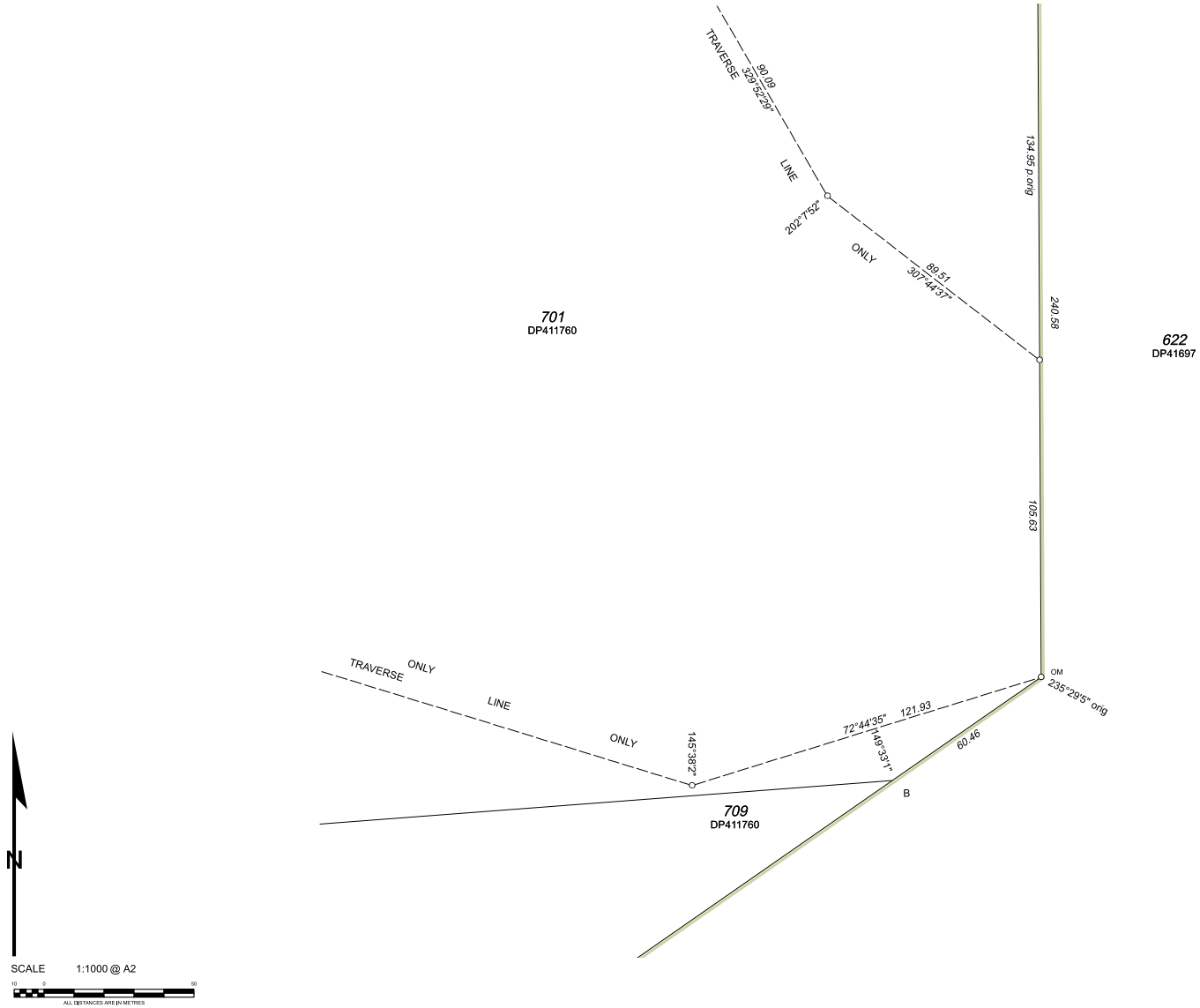
ENLARGEMENT A



ADDITIONAL SHEETS ENDORSEMENT SHEET	SHEET 3 OF SHEETS 5	VERSION NUMBER 4	DEPOSITED PLAN 411760

LANDGATE COPY OF ORIGINAL NOT TO SCALE 03/03/2022 04:34 PM Request number: 63278105

ENLARGEMENT B



ADDITIONAL SHEETS	SHEET		SHEETS	VERSION NUMBER	DEPOSITED PLAN
ENDORSEMENT SHEET	4	OF	5	4	411760

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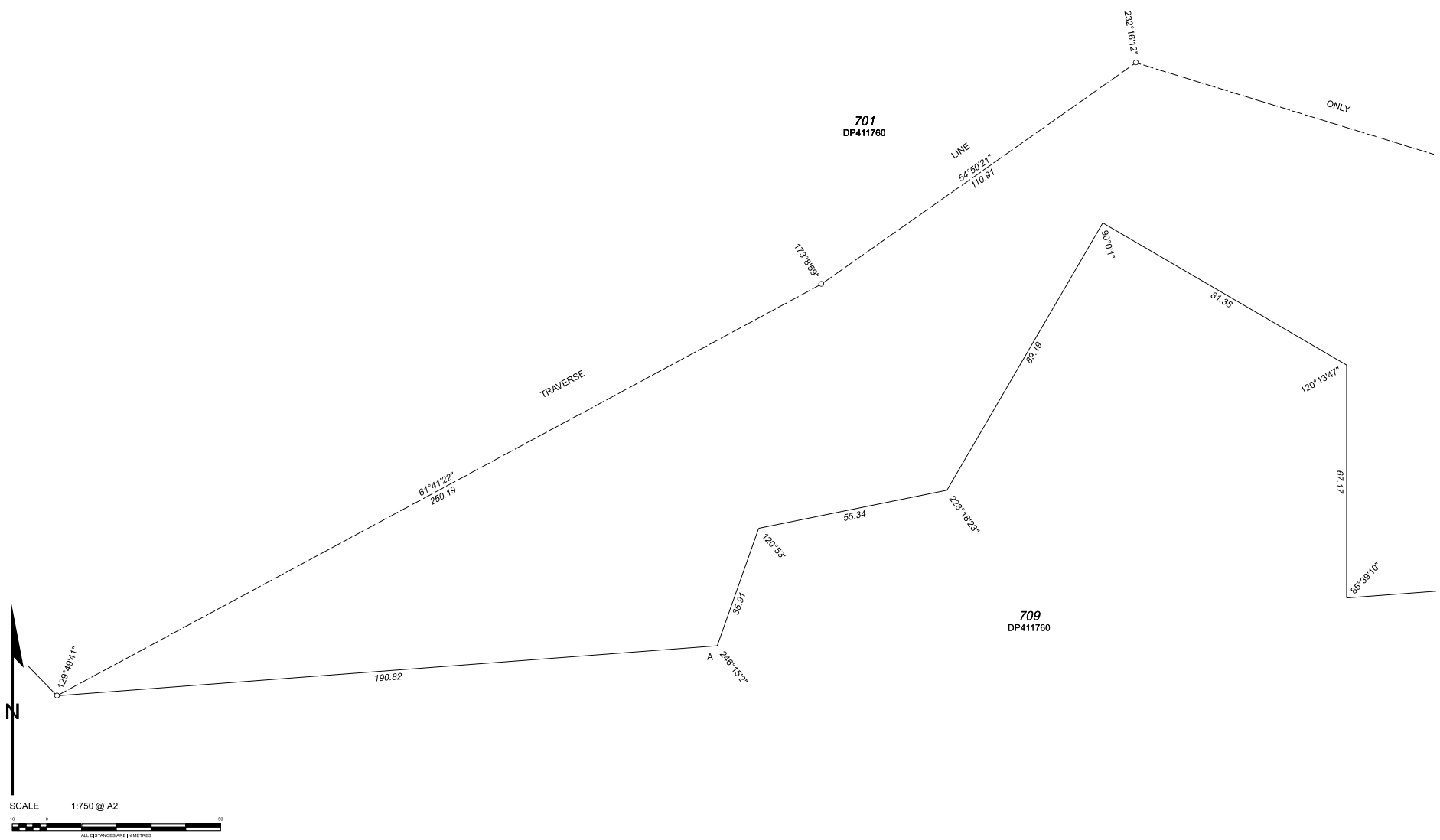
ENLARGEMENT C



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ADDITIONAL SHEETS	SHEET		SHEETS	VERSION NUMBER	DEPOSITED PLAN
ENDORSEMENT SHEET	5	OF	5	4	411760

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LANDGATE COPY OF ORIGINAL NOT TO SCALE 03/03/2022 04:34 PM Request number: 63278105

Lodgement and Examination

Lodgement Date	23/02/2022
Version 4 Submission Date	03/03/2022
Examination Date	03/03/2022

Western Australian Planning Commission

Planning Approval	Exempt
Reference	

In Order For Dealings

Subject To	• Reserve Action

	3.3.2022
For Inspector of Plans and Surveys / Authorised Land Officers	Date

Plan Approved

Inspector of Plans and Surveys / Authorised Land Officer	Date

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APPENDIX C: DATA TABLES

DRAFT

Table 4

Acid Sulfate Soils Field Analytical Results
January 2022
Perdaman Baseline Acid Sulfate Soil Investigation
754-PEREN297100

						pH Measurements				
					Analyte	pH (Fox)	pH (F)	pHF - pHFOX	Reaction Rate (L, M, H, X, V)	Net Acidity (excluding ANC)
					ALS lab code	(23Bf)	(23Af)	-	-	-
					Unit	pH Unit	pH Unit	pH Unit	-	%S
					LOR	0.1	0.1	-	1	0.02
Sample ID	**Depth (mBGL)**		**Soil Description**	**Sample Date**	**Guidelines (DER 2015)**	**<3**	**<4**	**1**	**NG**	**0.03**
ASS1_0	0	0.1	SANDY GRAVEL (with calcrete): brown, coarse, well sorted, sub-angular	28/01/2022	EP2201074012	6.9	8.5	1.6	M	0.02
ASS1_0.25	0.25	0.35		28/01/2022	EP2201074012	7	8.8	1.8	M	
ASS1_0.5	0.5	0.6		28/01/2022	EP2201074013	7	9.1	2.1	M	
ASS1_0.75	0.75	0.85	SANDY CLAY (with calcrete): coarse, white/grey, well sorted sub rounded	28/01/2022	EP2201074014	7	9.3	2.3	M	
ASS1_1.0	1	1.1		28/01/2022	EP2201074015	7	9.4	2.4	M	
ASS1_1.25	1.25	1.35		28/01/2022	EP2201074016	7.2	9.2	2	M	
ASS1_1.50	1.5	1.6		28/01/2022	EP2201074017	8.5	9.9	1.4	M	
ASS1_1.75	1.75	1.85		28/01/2022	EP2201074018	8.7	9.2	0.5	H	
ASS1_2.00	2	2.1		28/01/2022	EP2201074019	8.6	9.1	0.5	H	
ASS1_2.25	2.25	2.35		28/01/2022	EP2201074020	8	9.2	1.2	H	
ASS1_2.50	2.5	2.6		28/01/2022	EP2201074021	7.6	8.6	1	H	
ASS1_2.75	2.75	2.85		28/01/2022	EP2201074022	7.1	9.2	2.1	H	
ASS1_3.00	3	3.1		28/01/2022	EP2201074023	7.1	8.7	1.6	H	
ASS2_0	0	0.1	SANDY GRAVEL (with granophyre): brown, grey coarse, well sorted, sub-angular	28/01/2022	EP2201074025	7.8	9.1	1.3	H	
ASS2_0.25	0.25	0.35	CLAYEY SAND (with granophyre). Green/grey/brown, coarse, well sorted, sub rounded to sub-angular. Refusal at 0.3m	28/01/2022	EP2201074026	7.2	9.4	2.2	X	
ASS3_0	0	0.1	SANDY GRAVEL (with granophyre). Brown, coarse,	28/01/2022	EP2201074027	8	8.8	0.8	X	
ASS3_0.25	0.25	0.35		28/01/2022	EP2201074028	7.6	8.2	0.6	X	
ASS3_0.50	0.5	0.6	GRAVELLY SAND (with granophyre). Grey/brown, coarse, well sorted, sub	28/01/2022	EP2201074029	8.2	8.4	0.2	X	
ASS3_0.75	0.75	0.85		28/01/2022	EP2201074030	7.6	8.8	1.2	X	
ASS3_0.90	0.9	1		28/01/2022	EP2201074031	8.3	8.8	0.5	X	
ASS4_0	0	0.1	SANDY SILT: Red/brown, fine grained, sub-rounded, well	28/01/2022	EP2201074036	8	9.1	1.1	X	
ASS4_0.25	0.25	0.35		28/01/2022	EP2201074037	7.8	9.2	1.4	X	
ASS4_0.50	0.5	0.6	SANDY SILT: Grey, coarse, sub-rounded to sub-angular, well sorted, with granophyre	28/01/2022	EP2201074038	7.4	8.4	1	X	
ASS4_0.75	0.75	0.85	GRANOPHYRE, grey, coarse, sub-angular, poorly sorted	28/01/2022	EP2201074039	7.7	8.1	0.4	X	
ASS4_1.0	1	1.1	SANDY CLAY: coarse, red/brown, mottled, sub-rounded, sub angular, well sorted, with some gravel	28/01/2022	EP2201074040	8.5	8.7	0.2	X	
ASS4_1.25	1.25	1.35	SANDY SILT: fine, red/brown, sub-rounded, well sorted, with gravel	28/01/2022	EP2201074041	8	8.3	0.3	X	
ASS5_0	0	0.1	SANDY SILT: fine, brown, sub-rounded to sub-angular, well sorted, with granophyre	28/01/2022	EP2201074042	6.9	8.4	1.5	X	
ASS5_0.25	0.25	0.35		28/01/2022	EP2201074043	6.4	8.4	2	X	
ASS5_0.50	0.5	0.6		28/01/2022	EP2201074044	6.9	8.4	1.5	X	
ASS5_0.75	0.75	0.85		28/01/2022	EP2201074045	7.1	8.1	1	X	
ASS5_0.90	0.9	1	SANDY CLAY: fine, mottled, brown/red/yellow/grey, sub-rounded to sub-angular, well sorted, with granophyre. Refusal at 0.9m	28/01/2022	EP2201074046	7.7	8.3	0.6	X	
ASS6_0m	0	0.1	SANDY CLAY: brown, very soft and saturated, fine grained	28/01/2022	EP2201008032	6.6	8.2	1.6	M	
ASS6_0.25m	0.25	0.35		28/01/2022	EP2201008033	6.7	7.6	0.9	M	0.11
ASS6_0.5m	0.5	0.6		28/01/2022	EP2201008034	6.6	7.6	1	M	
ASS6_0.75m	0.75	0.85	CLAY, grey-black, granophyre fragments present	28/01/2022	EP2201008035	6.6	7.9	1.3	M	
ASS6_1.0m	1	1.1		28/01/2022	EP2201008036	5.9	7.6	1.7	M	0.34
ASS7_0m	0	0.1	SANDY GRAVEL: red-brown, poorly sorted, sub-angular to	26/01/2022	EP2201008037	6.5	7.8	1.3	L	
ASS7_0.25m	0.25	0.35		26/01/2022	EP2201008038	6.3	7.9	1.6	M	0.04
ASS7_0.5m	0.5	0.6	CLAY, brown with fragments of calcrete	26/01/2022	EP2201008039	6.6	7.8	1.2	L	
ASS7_0.75m	0.75	0.85		26/01/2022	EP2201008040	6.6	7.8	1.2	L	0.03
ASS8_0m	0	0.1	SANDY GRAVEL: red brown, subrounded to subangular, poorly sorted, fragments of	24/01/2022	EP2200878004	6.9	8.1	1.2	H	
ASS8_0.25m	0.25	0.35		24/01/2022	EP2200878005	7	8.4	1.4	H	
ASS8_0.5m	0.5	0.6		24/01/2022	EP2200878006	7.1	8.3	1.2	M	
ASS8_0.75m	0.75	0.85	CLAY, brown, dense, high plasticity	24/01/2022	EP2200878007	7	8.2	1.2	M	
ASS8_1.00m	1	1.1		24/01/2022	EP2200878008	7.8	8.5	0.7	M	
ASS8_1.25m	1.25	1.35		24/01/2022	EP2200878009	6.8	8.7	1.9	L	
ASS8_1.5m	1.5	1.6	CALCRETE: pink-white, fragments of granophyre	24/01/2022	EP2200878010	6.9	8.8	1.9	L	
ASS8_1.75m	1.75	1.85		24/01/2022	EP2200878011	6.7	9	2.3	L	
ASS8_2m	2	2.1		24/01/2022	EP2200878012	6.8	9.2	2.4	L	
ASS8_2.25m	2.25	2.35		24/01/2022	EP2200878013	6.8	9	2.2	M	
ASS8_2.5m	2.5	2.6		24/01/2022	EP2200878014	6.8	8.4	1.6	L	
ASS8_2.75m	2.75	2.85		24/01/2022	EP2200878015	6.9	9	2.1	L	
ASS8_3m	3	3.1		24/01/2022	EP2200878016	7	9	2	L	
ASS9_0m	0	0.1	SANDY CLAY: brown, medium grained	24/01/2022	EP2201003018	7.2	8.4	1.2	M	
ASS9_0.25m	0.25	0.35	CLAY, orange, high plasticity, fragments of granophyre present	24/01/2022	EP2201003019	7.4	8.4	1	M	
ASS9_0.5m	0.5	0.6		24/01/2022	EP2201003020	6.8	8.8	2	L	
ASS9_0.75m	0.75	0.85		24/01/2022	EP2201003021	6.9	9.1	2.2	L	
ASS9_1.0m	1	1.1		24/01/2022	EP2201003022	6.9	9.2	2.3	L	
ASS9_1.25m	1.25	1.35		24/01/2022	EP2201003023	6.8	8.9	2.1	L	
ASS9_1.5m	1.5	1.6		24/01/2022	EP2201003024	6.6	8.8	2.2	L	
ASS9_1.75m	1.75	1.85	CALCRETE, pink-pale brown becoming white with depth, mottled appearance, clayey texture, calcareous in nature	24/01/2022	EP2201003025	6.6	8.8	2.2	L	
ASS9_2m	2	2.1		24/01/2022	EP2201003026	6.7	8.8	2.1	L	
ASS9_2.25m	2.25	2.35		24/01/2022	EP2201003027	6.7	8.8	2.1	L	
ASS9_2.5m	2.5	2.6		24/01/2022	EP2201003028	6.7	8.7	2	L	
ASS9_2.75m	2.75	2.85		24/01/2022	EP2201003029	6.8	8.6	1.8	L	
ASS9_3m	3	3.1		24/01/2022	EP2201003030	6.8	8.8	2	L	
ASS10_0m	0	0.1	SAND, orange-brown, medium grained, moderately sorted with minor clay	25/01/2022	EP2201003005	6.8	8	1.2	M	0.03
ASS10_0.25m	0.25	0.35		25/01/2022	EP2201003006	6.8	8.1	1.3	M	0.04
ASS10_0.5m	0.5	0.6		25/01/2022	EP2201003007	6.9	8.2	1.3	M	
ASS10_0.75m	0.75	0.85	CALCRETE, pink-white becoming grey-white with increasing depth, granophyre fragments, calcareous in nature and mottled appearance, clayey texture	25/01/2022	EP2201003008	6.7	8.6	1.9	S	
ASS10_1.0m	1	1.1		25/01/2022	EP2201003009	6.7	8.6	1.9	S	
ASS10_1.25m	1.25	1.35		25/01/2022	EP2201003010	6.8	8.8	2	S	
ASS10_1.5m	1.5	1.6		25/01/2022	EP2201003011	6.8	8.6	1.8	S	
ASS10_1.75m	1.75	1.85		25/01/2022	EP2201003012	6.8	9	2.2	M	
ASS10_2.0m	2	2.1		25/01/2022	EP2201003013	6.8	8.8	2	M	
ASS10_2.25m	2.25	2.35		25/01/2022	EP2201003014	6.8	8.8	2	M	
ASS10_2.5m	2.5	2.6		25/01/2022	EP2201003015	6.9	8.8	1.9	M	

Table 4

Acid Sulfate Soils Field Analytical Results
January 2022
Perdaman Baseline Acid Sulfate Soil Investigation
754-PEREN297100

						pH Measurements				
					Analyte	pH (Fox)	pH (F)	pHF - pHFOX	Reaction Rate (L, M, H, X, V)	Net Acidity (excluding ANC)
					ALS lab code	(23Bf)	(23Af)	-	-	-
					Unit	pH Unit	pH Unit	pH Unit	-	%S
					LOR	0.1	0.1	-	1	0.02
Sample ID	**Depth (mBGL)**		**Soil Description**	**Sample Date**	**Guidelines (DER 2015)**	**<3**	**<4**	**1**	**NG**	**0.03**
ASS10_2.75m	2.75	2.85		25/01/2022	EP2201003016	6.8	8.7	1.9	M	
ASS10_3.0m	3	3.1		25/01/2022	EP2201003017	6.8	8.6	1.8	M	
ASS11_0m	0	0.1	SANDY CLAY: red-brown, moderately sorted and medium grained with	25/01/2022	EP2201003035	7.4	8.7	1.3	M	0.04
ASS11_0.25m	0.25	0.35		25/01/2022	EP2201003036	7.5	8.8	1.3	M	
ASS11_0.5m	0.5	0.6		25/01/2022	EP2201003037	8.2	8.8	0.6	H	
ASS11_0.75m	75	75.1	CLAY: red with granophyre fragments, high plasticity	25/01/2022	EP2201003038	6.7	8.7	2	L	
ASS11_1.0m	1	1.1	GRANOPHYRE: grey, X-stalline, fresh in nature	25/01/2022	EP2201003039	6.8	8.8	2	L	
ASS12_0m	0	0.1		25/01/2022	EP2201003040	7.5	8.3	0.8	H	0.02
ASS12_0.25m	0.25	0.35	SANDY GRAVEL: red-brown, poorly sorted with sub-angular to sub-rounded grains of calcrete and granophyre, shell fragments present	25/01/2022	EP2201003041	6.9	8.2	1.3	M	
ASS12_0.5m	0.5	0.6		25/01/2022	EP2201003042	6.9	8.2	1.3	M	0.09
ASS12_0.75m	0.75	0.85		25/01/2022	EP2201003043	6.7	8.3	1.6	L	
ASS12_1.0m	1	1.1		25/01/2022	EP2201003044	7.3	8.6	1.3	M	
ASS12_1.25m	1.25	1.35		25/01/2022	EP2201003045	6.4	8.9	2.5	M	
ASS12_1.5m	1.5	1.6		25/01/2022	EP2201003046	6.6	9	2.4	L	
ASS12_1.75m	1.75	1.85	CALCRETE: red-white with areas of grey, mottled appearance, calcareous fragments of granophyre present	25/01/2022	EP2201003047	6.8	8.8	2	L	
ASS12_2m	2	2.1		25/01/2022	EP2201003048	6.8	9	2.2	L	
ASS12_2.25m	2.25	2.35		25/01/2022	EP2201003049	6.8	9.1	2.3	M	
ASS12_2.5m	2.5	2.6		25/01/2022	EP2201003050	7.1	9	1.9	M	
ASS12_2.75m	2.75	2.85		25/01/2022	EP2201003051	7.1	9	1.9	M	
ASS12_3m	3	3.1		25/01/2022	EP2201003052	6.9	8.7	1.8	L	
ASS13_0m	0	0.1	SAND: brown, medium grained, moderately sorted	26/01/2022	EP2201008027	6.9	8.6	1.7	M	0.08
ASS13_0.25m	0.25	0.35		26/01/2022	EP2201008028	7.7	8.7	1	M	
ASS13_0.5m	0.5	0.6	CALCRETE: pale pink-white, mottled appearance	26/01/2022	EP2201008029	7.1	8.6	1.5	M	
ASS13_0.75m	0.75	0.85	CALCRETISED GRANOPHYRE: grey, weathered with calcrete	26/01/2022	EP2201008030	7.2	9	1.8	M	
ASS13_1.0m	1	1.1		26/01/2022	EP2201008031	8.8	9.5	0.7	M	
ASS14_0m	0	0.1	SANDY CLAY: brown, moderately sorted and	25/01/2022	EP2201003068	7.1	8.2	1.1	H	0.07
ASS14_0.25m	0.25	0.35		25/01/2022	EP2201003069	6.9	8.2	1.3	H	
ASS14_0.5m	0.5	0.6	CLAY: brown, conatins granophyre bits	25/01/2022	EP2201003070	7.1	8.3	1.2	M	
ASS14_0.75m	0.75	0.85		25/01/2022	EP2201003071	7.3	8.8	1.5	M	
ASS15_0m	0	0.1	CLAYEY GRAVEL: orange-brown, poorly sorted,	26/01/2022	EP2201008014	6.7	8.6	1.9	M	
ASS15_0.25m	0.25	0.35		26/01/2022	EP2201008015	6.8	8.6	1.8	M	
ASS15_0.5m	0.5	0.6	SANDY CLAY: orange, high plasticity, minor granophyre and calcrete	26/01/2022	EP2201008016	8.1	9.6	1.5	M	
ASS15_0.75m	0.75	0.85		26/01/2022	EP2201008017	7.4	10.2	2.8	L	
ASS15_1.0m	1	1.1		26/01/2022	EP2201008018	7.3	9.9	2.6	L	
ASS15_1.25m	1.25	1.35		26/01/2022	EP2201008019	7.3	9.9	2.6	L	
ASS15_1.5m	1.5	1.6		26/01/2022	EP2201008020	9	10	1	M	
ASS15_1.75m	1.75	1.85	CALCRETE: pink-white, mottled, calcareous	26/01/2022	EP2201008021	7.3	9.5	2.2	M	
ASS15_2.0m	2	2.1		26/01/2022	EP2201008022	6.9	9.8	2.9	L	
ASS16_0m	0	0.1	CLAY: brown, high plasticity.	26/01/2022	EP2201008001	7	8.5	1.5	L	
ASS16_0.25m	0.25	0.35		26/01/2022	EP2201008002	7	8.4	1.4	L	
ASS16_0.5m	0.5	0.6		26/01/2022	EP2201008003	7.2	8.9	1.7	L	
ASS16_0.75m	0.75	0.85		26/01/2022	EP2201008004	7.2	8.8	1.6	L	
ASS16_1.0m	1	1.1		26/01/2022	EP2201008005	7	8.6	1.6	L	0.02
ASS16_1.25m	1.25	1.35		26/01/2022	EP2201008006	6.9	8.7	1.8	L	
ASS16_1.5m	1.5	1.6	CLAY: pink-brown, high plasticity.	26/01/2022	EP2201008007	7.1	8.6	1.5	L	
ASS16_1.75m	1.75	1.85		26/01/2022	EP2201008008	6.9	9.1	2.2	L	
ASS16_2.0m	2	2.1	CALCRETE: red-brown-white, mottled, calcerous with dark grey bands of granophyre material	26/01/2022	EP2201008009	6.9	9.1	2.2	L	
ASS16_2.25m	2.25	2.35		26/01/2022	EP2201008010	6.9	9.1	2.2	L	
ASS16_2.5m	2.5	2.6		26/01/2022	EP2201008011	6.8	9	2.2	L	
ASS16_2.75m	2.75	2.85		26/01/2022	EP2201008012	7.4	8.8	1.4	M	
ASS16_3.0m	3	3.1		26/01/2022	EP2201008013	6.9	8.6	1.7	M	
ASS17_0m	0	0.1	CLAYEY SAND: brown, medium grained, pieces of granophyre	26/01/2022	EP2201008023	7.5	9.5	2	M	
ASS17_0.25m	0.25	0.35	CALCRETE: pink-brown to white, mottled appearance, calcareous with fragments of	26/01/2022	EP2201008024	8	9.6	1.6	M	
ASS17_0.5m	0.5	0.6		26/01/2022	EP2201008025	7.5	10	2.5	M	
ASS17_0.75m	0.75	0.85		26/01/2022	EP2201008026	7.6	9.8	2.2	M	
ASS18_0m	0	0.1	CLAY: brown, high plasticity, fragments of calcrete	25/01/2022	EP2201003057	7.3	7.8	0.5	M	
ASS18_0.25m	0.25	0.35		25/01/2022	EP2201003058	7.6	8.1	0.5	H	
ASS18_0.5m	0.5	0.6	CALCRETE: pink-white-brown, mottled in appearance, calcareous in nature	25/01/2022	EP2201003059	6.9	8.2	1.3	L	0.03
ASS18_0.75m	0.75	0.85		25/01/2022	EP2201003060	6.8	8.2	1.4	L	
ASS18_1.25m	1.25	1.35		25/01/2022	EP2201003062	6.7	8.4	1.7	L	
ASS18_1.5m	1.5	1.6		25/01/2022	EP2201003063	6.7	8.5	1.8	L	
ASS18_1.75m	1.75	1.85		25/01/2022	EP2201003064	6.8	8.6	1.8	L	
ASS18_2m	2	2.1		25/01/2022	EP2201003065	6.8	8.5	1.7	L	
ASS18_2.25m	2.25	2.35		25/01/2022	EP2201003066	6.9	8.4	1.5	L	
ASS18_2.5m	2.5	2.6		25/01/2022	EP2201003067	6.7	8.4	1.7	L	
ASS19_0m	0	0.1	SANDY CLAY: pink-brown, fine grained	27/01/2022	EP2201086024	8.3	8.7	0.4	X	
ASS19_0.25m	0.25	0.35		27/01/2022	EP2201086025	8.2	8.6	0.4	X	
ASS19_0.5m	0.5	0.6		27/01/2022	EP2201086026	7.8	8.7	0.9	X	
ASS20_0m	0	0.1	SAND: brown, moderately sorted with minor shell fragments	27/01/2022	EP2201086001	7.4	8.4	1	M	0.04
ASS20_0.25m	0.25	0.35	CALCRETE: red-pink-white, mottled appearance, intermittent grey clay bands	27/01/2022	EP2201086002	9.3	9.1	-0.2	H	
ASS20_0.5m	0.5	0.6		27/01/2022	EP2201086003	9.2	9.3	0.1	H	
ASS20_0.75m	0.75	0.85		27/01/2022	EP2201086004	7.5	9	1.5	H	
ASS20_1.0m	1	1.1		27/01/2022	EP2201086005	7.2	9	1.8	H	
ASS20_1.25m	1.25	1.35		27/01/2022	EP2201086006	8.4	9	0.6	H	
ASS20_1.5m	1.5	1.6	SANDY CLAY: brown, fine grained, moderate plasticity	27/01/2022	EP2201086007	8.2	8.7	0.5	H	
ASS20_1.75m	1.75	1.85	CALCRETISED GRANOPHYRE: grey, inclusions of calcrete	27/01/2022	EP2201086008	8.8	9.2	0.4	H	
ASS20_2.0m	2	2.1		27/01/2022	EP2201086009	8.5	8.9	0.4	X	
ASS21_0	0	0.1	SANDY GRAVEL: coarse, brown, grey, sub angular, well sorted,	28/01/2022	EP2201074006	7	8.1	1.1	M	0.06
ASS21_0.25	0.25	0.35		28/01/2022	EP2201074007	7	8.2	1.2	M	
ASS22_0	0	0.1	SANDY GRAVEL with calcrete: brown, coarse, well sorted, sub-	12/02/2022	EP2201790001	6.6	8	1.4	X	
ASS22_0.25	0.25	0.35		12/02/2022	EP2201790002	7.7	8.2	0.5	X	
ASS22_0.5	0.5	0.6	SANDY CLAY: coarse, white/grey, well sorted, sub rounded, with some gravel (calcrete)	12/02/2022	EP2201790003	8.6	8.8	0.2	X	
ASS22_0.75	0.75	0.85		12/02/2022	EP2201790004	8.3	8.4	0.1	X	
ASS22_1.0	1	1.1		12/02/2022	EP2201790005	8.6	8.5	-0.1	X	
ASS22_1.25	1.25	1.35		12/02/2022	EP2201790006	8.8	8.6	-0.2	X	
ASS22_1.5	1.5	1.6		12/02/2022	EP2201790007	7.9	8.3	0.4	X	
ASS22_1.75	1.75	1.85		12/02/2022	EP2201790008	8.4	8.5	0.1	X	
ASS22_2.0	2	2.1		12/02/2022	EP2201790009	7.5	9	1.5	X	
QC5	0.5	0.6	SANDY CLAY: red-brown, moderately sorted and medium grained with fragments of granophyre	25/01/2022	EP2201003080	8.3	9	0.7	M	
QC7	1	1.1	GRANOPHYRE: grey, X-stalline, fresh in nature	1/25/2022	EP2201003082	6.5	7.7	1.2	M	
QC9	0.5	0.6	SANDY GRAVEL: red-brown, poorly sorted with sub-angular to sub-rounded grains of calcrete and granophyre, shell fragments present	1/25/2022	EP2201003084	7.1	7.9	0.8	M	0.1
QC15	0.5	0.6	CALCRETE: pink-brown to white, mottled appearance, calcareous with fragments of granophyre	26/01/2022	EP2201008041	7.2	9.7	2.5	L	
QC28	0.5	0.6	SANDY SILT: fine, brown, sub-rounded to sub-angular, well sorted, with granophyre	1/28/2022	EP2201074051	7.2	8.6	1.4	X	

Table 3

Acid Sulfate Soils Analytical Results
January 2022
Perdaman Baseline Acid Sulfate Soil Investigation
754-PERENZ97100

					pH Measurements		Acidity Trail						Sulfur Trail					Potential Acidity							
					pH KCl	pH OX	Titratable Actual Acidity	Titratable Peroxide Acidity	Titratable Sulfide Acidity	sulfidic - Titratable Actual Acidity	sulfidic - Titratable Peroxide Acidity	sulfidic - Titratable Sulfidic Acidity	KCl Extractable Sulfur	Peroxide Sulfur	Peroxide Oxidisable Sulfur	acidity - Peroxide Oxidisable Sulfur	Chromium Reducible Sulfur	acidity - Chromium Reducible Sulfur	acidity - Acid Neutralising Capacity	sulfidic - Acid Neutralising Capacity	acidity - Excess Acid Neutralising Capacity	sulfidic - Excess Acid Neutralising Capacity	Net Acidity excluding ANC (sulfur units)	Net Acidity excluding ANC (acidity units)
				Analyte																					
				ALS lab code	(23A)	(23B)	(23F)	(23G)	(23H)	(s-23F)	(s-23G)	(s-23H)	(23Ca)	(23Oa)	(23I)	(a-23I)	(23R)	(a-23R)	(a-19A2)	(s-19A2)	(a-23Q)	(s-23Q)	-	-
				Unit	pH Unit	pH Unit	mole H+ / t	mole H+ / t	mole H+ / t	% pyrite S	% pyrite S	% pyrite S	% S	% S	% S	mole H+ / t	% S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	% S	mole H+ / t
				LOR	0.1	0.1	2	2	2	0.005	0.005	0.005	0.005	0.005	0.005	5	0.005	10	10	0.01	10	0.02	0.02	10
				Guideline	NE	NE	0.03	0.08	NE	0.09	0.09	NE	NE	NE	0.09	NE	0.09	NE	NE	NE	NE	NE	0.03	NE
Sample ID	Depth (m BGL) From	Depth (m BGL) To	Soil Description	Sample Date	Sample Code																				
ASS01_0.0	0	0.1	Sandy GRAVEL with calcrete: brown, coarse, well sorted, sub-angular	28/01/2022	EP2201074024		5.3	8.4	<2	<2	<2	<0.005	<0.005	<0.005	0.024	0.049	0.024	15	-	-	5290	8.48	0.02	15
ASS01_0.5	0.5	0.6		28/01/2022	EP2201330003		-	-	-	-	-	-	-	-	-	-	0.006	<10	10600	17	-	-	<0.02	<10
ASS01_1.5	1.5	1.6	Sandy CLAY with calcrete: coarse, white/grey, well sorted, sub-rounde	28/01/2022	EP2201330004		-	-	-	-	-	-	-	-	-	-	<0.005	<10	10600	17	-	-	<0.02	<10
ASS01_2.5	2.5	2.6		28/01/2022	EP2201330005		-	-	-	-	-	-	-	-	-	-	0.006	<10	11400	18.3	-	-	<0.02	<10
ASS03_0.25	0.25	0.35	Sandy GRAVEL with granophyre: brown, coarse, well sorted, sub-angular	26/01/2022	EP2201330007		8.7	8.4	<2	<2	<2	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<5	-	-	-	-	400	0.961	<0.02	<10
ASS03_0.75	0.75	0.85	Gravelly SAND with granophyre: coarse, grey/brown, well sorted, sub-rounded to sub	28/01/2022	EP2201330008		-	-	-	-	-	-	-	-	-	-	<0.005	<10	3300	5.29	-	-	<0.02	<10
ASS04_0.5	0.5	0.6	SANDY SILT: Grey, coarse, sub-rounded to sub-angular, well sorted, with granophyre	28/01/2022	EP2201330009		8.7	9.2	<2	<2	<2	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<5	-	-	-	-	293	0.405	<0.02	<10
ASS04_1.0	1	1.1	Sandy CLAY: coarse, red/brown, mottled, sub rounded, sub angular, well sorted, with some gravel	28/01/2022	EP2201330010		8.8	9.5	<2	-	-	<0.02	-	-	-	-	0.007	<10	592	0.95	-	-	<0.02	<10
ASS05_0.5	0.5	0.6	Sandy SILT: fine, brown, sub-rounded to sub-angular, well sorted, with granophyre	28/01/2022	EP2201330011		-	-	-	-	-	-	-	-	-	-	<0.005	<10	520	0.19	-	-	<0.02	<10
ASS05_0.9	0.9	1	Sandy CLAY: fine, mottled, brown/red/yellow/grey, sub-rounded to sub-angular, well sorted, with granophyre. Refusal at 0.9m	28/01/2022	EP2201330012		8.4	8.9	<2	<2	<2	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<5	-	-	-	-	334	0.536	<0.02	<10
ASS06_0.25	0.25	0.35	Sandy CLAY: brown, very soft and saturated, fine grained	26/01/2022	EP2201334001		9.4	8.3	<2	<2	<2	<0.005	<0.005	<0.005	0.099	0.21	0.111	69	-	-	-	-	9430	15.1	0.11	69
ASS06_1.0	1	1.1	CLAY, grey-black, granophyre fragments present	26/01/2022	EP2201334002		-	-	-	-	-	-	-	-	-	-	0.341	213	5130	8.23	-	-	-	-	0.34	213
ASS07_0.25	0.25	0.35	Sandy GRAVEL: red-brown, poorly sorted, sub angular to sub-rounded grains of	26/01/2022	EP2201334003		-	-	-	-	-	-	-	-	-	-	0.036	22	9560	8.99	-	-	-	-	0.04	22
ASS07_0.75	0.75	0.85	CLAY: brown with fragments of calcrete	26/01/2022	EP2201334004		9.4	8.2	<2	<2	<2	<0.005	<0.005	<0.005	0.08	0.112	0.032	20	-	-	5310	8.5	0.03	20
ASS08_0.25	0.25	0.35	Sandy GRAVEL: red brown, subrounded to subangular, poorly sorted, fragments of granophyre and shells	24/01/2022	EP2200961001		-	-	-	-	-	-	-	-	-	-	<0.005	<10	5260	13.3	-	-	<0.02	<10
ASS08_1.25	1.25	1.35	CLAY, brown, dense, high plasticity	24/01/2022	EP2200961002		9.5	8.2	<2	<2	<2	<0.005	<0.005	<0.005	0.058	0.07	0.012	7	-	-	-	-	10000	16	<0.02	<10
ASS08_1.75	1.75	1.85	CALCRETE: pink-white, fragments of granophyre	24/01/2022	EP2200961003		-	-	-	-	-	-	-	-	-	-	<0.005	<10	10200	16.4	-	-	<0.02	<10
ASS08_2.75	2.75	2.85		24/01/2022	EP2200961004		9.4	8.2	<2	<2	<2	<0.005	<0.005	<0.005	0.038	0.038	<0.005	<5	-	-	10100	16.1	<0.02	<10
ASS09_0.0	0	0.1	Sandy CLAY: brown, medium grained	25/01/2022	EP2201417001		-	-	-	-	-	-	-	-	-	-	<0.005	<10	10100	16.2	-	-	<0.02	<10
ASS09_0.5	0.5	0.6	CLAY: orange, high plasticity, fragments of granophyre present	25/01/2022	EP2201247016		-	-	-	-	-	-	-	-	-	-	<0.005	<10	9720	15.6	-	-	<0.02	<10
ASS09_1.0	1	1.1		25/01/2022	EP2201417002		9.6	8.1	<2	<2	<2	<0.005	<0.005	<0.005	0.065	0.077	0.012	7	-	-	9980	16	<0.02	<10
ASS09_2.0	2	2.1	CALCRETE: pink-pale brown becoming white with depth, mottled appearance, clayey texture, calcareous in nature	25/01/2022	EP2201417003		-	-	-	-	-	-	-	-	-	-	<0.005	<10	6950	11.1	-	-	<0.02	<10
ASS09_2.5	2.5	2.6		25/01/2022	EP2201247018		-	-	-	-	-	-	-	-	-	-	<0.005	<10	8620	12.8	-	-	<0.02	<10
ASS09_3.0	3	3.1		25/01/2022	EP2201417004		-	-	-	-	-	-	-	-	-	-	<0.005	<10	10300	16.5	-	-	<0.02	<10
ASS10_0.0	0	0.1	SAND: orange-brown, medium grained, moderately sorted with minor clay	25/01/2022	EP2201417005		9.4	8.1	<2	<2	<2	<0.005	<0.005	<0.005	0.298	0.327	0.029	18	-	-	4300	6.97	0.03	18
ASS10_0.25	0.25	0.35		25/01/2022	EP2201417011		9.5	8	<2	<2	<2	<0.005	<0.005	<0.005	0.137	0.181	0.044	27	-	-	5160	8.27	0.04	27
ASS10_0.5	0.5	0.6		25/01/2022	EP2201417006		-	-	-	-	-	-	-	-	-	-	<0.005	<10	10200	16.6	-	-	<0.02	<10
ASS10_1.75	1.75	1.85	CALCRETE: pink-white becoming grey-white with increasing depth, granophyre fragments, calcareous in nature and mottled appearance, clayey texture	25/01/2022	EP2201247012		-	-	-	-	-	-	-	-	-	-	<0.005	<10	7270	11.8	-	-	<0.02	<10
ASS10_2.0	2	2.1		25/01/2022	EP2201417007		-	-	-	-	-	-	-	-	-	-	<0.005	<10	7300	11.8	-	-	<0.02	<10
ASS10_2.25	2.25	2.35		25/01/2022	EP2201247013		-	-	-	-	-	-	-	-	-	-	<0.005	<10	6790	10.8	-	-	<0.02	<10
ASS10_2.75	2.75	2.85		25/01/2022	EP2201247014		-	-	-	-	-	-	-	-	-	-	<0.005	<10	4660	7.48	-	-	<0.02	<10
ASS10_3.0	3	3.1		25/01/2022	EP2201417008		-	-	-	-	-	-	-	-	-	-	<0.005	<10	5560	8.91	-	-	<0.02	<10
ASS11_0.0	0	0.1	Sandy CLAY: red-brown, moderately sorted and medium grained with fragments of GRANOPHYRE, grey, X-stalline, fresh in nature	25/01/2022	EP2201417009		9.6	8.3	<2	<2	<2	<0.005	<0.005	<0.005	0.022	0.058	0.036	22	-	-	4060	6.5	0.04	22
ASS11_0.25	0.25	0.35		25/01/2022	EP2201247009		-	-	-	-	-	-	-	-	-	-	<0.005	<10	9390	15	-	-	<0.02	<10
ASS11_1.0	1	1.1		25/01/2022	EP2201247010		9.6	7.8	<2	<2	<2	<0.005	<0.005	<0.005	0.02	0.022	<0.005	<5	-	-	574	0.919	<0.02	<10
ASS12_0.0	0	0.1	Sandy GRAVELS: red-brown, poorly sorted with sub-angular to sub-rounded grains of calcrete and granophyre, shell fragments present	25/01/2022	EP2201417005		-	-	-	-	-	-	-	-	-	-	0.024	15	9650	15.5	-	-	0.02	15
ASS12_0.5	0.5	0.6		25/01/2022	EP2201247005		9.7	8.1	<2	<2	<2	<0.005	<0.005	<0.005	0.13	0.224	0.094	59	-	-	8650	13.8	0.09	59
ASS12_1.5	1.5	1.6	CALCRETE, red white with areas of grey, mottled appearance, calcareous fragments of granophyre present	25/01/2022	EP2201247007		-	-	-	-	-	-	-	-	-	-	0.006	<10	13700	22	-	-	<0.02	<10
ASS12_2.25	2.25	2.35		25/01/2022	EP2201417014		-	-	-	-	-	-	-	-	-	-	<0.005	<10	15400	24.7	-	-	<0.02	<10
ASS12_2.5	2.5	2.6		25/01/2022	EP2201247008		-	-	-	-	-	-	-	-	-	-	<0.005	<10	9070	14.5	-	-	<0.02	<10
ASS13_0.0	0	0.1	SAND: brown, medium grained, moderately sorted with fragments of granophyre and shells	26/01/2022	EP2201334005		9.4	8.3	<2	<2	<2	<0.005	<0.005	<0.005	0.083	0.161	0.078	49	-	-	8120	13	0.08	49
ASS13_1.0	1	1.1	Calcretised GRANOPHYRE: grey, weathered with calcrete inclusions	26/01/2022	EP2201334006		-	-	-	-	-	-	-	-	-	-	<0.005	<10	3120	5.01	-	-	<0.02	<10
ASS14_0.0	0	0.1	Sandy GRAVEL: red-brown, poorly sorted with sub-angular to sub-rounded grains of calcrete and granophyre, shell fragments present	25/01/2022	EP2201417015		9.6	8.2	<2	<2	<2	<0.005	<0.005	<0.005	0.146	0.215	0.069	43	-	-	6000	9.74	0.07	43
ASS14_0.5	0.5	0.6	CLAY: brown, consists granophyre bits	25/01/2022	EP2201247004		9.8	8	<2	<2	<2	<0.005	<0.005	<0.005	0.065	0.079	0.014	9	-	-	2010	3.22	<0.02	<10
ASS14_0.75	0.75	0.85		25/01/2022	EP2201417016		-	-	-	-	-	-	-	-	-	-	<0.005	<10	2790	4.47	-	-	<0.02	<10
ASS15_0.25	0.25	0.35	Clayey GRAVEL: orange-brown, poorly sorted, subrounded to subangular, fragments of calcrete and granophyre	26/01/2022	EP2201334007		-	-	-	-	-	-	-	-	-	-	<0.005	<10	7640	12.2	-	-	<0.02	<10
ASS15_1.0	1	1.1	Sandy CLAY, orange, high plasticity, minor granophyre and calcrete	26/01/2022	EP2201334008		9.5	8.3	<2	<2	<2	<0.005	<0.005	<0.005	0.029	0.039	0.01	6	-	-	8980	13.7	<0.02	<10
ASS15_1.75	1.75	1.85	CALCRETE: pink-white, mottled, calcareous	26/01/2022	EP2201334009		-	-	-	-	-	-	-	-	-	-	<0.005	<10	13100	21	-	-	<0.02	<10
ASS16_0.0	0	0.1	CLAY: brown, high plasticity,	26/01/2022	EP2201334010		-	-	-	-	-	-	-	-	-	-	<0.005	<10	11300	18.2	-	-	<0.02	<10
ASS16_1.0	1	1.1		26/01/2022	EP2201334011		9.7	8.3	<2	<2	<2	<0.005	<0.005	<0.005	0.026	0.044	0.018	11	-	-	9420	15.1	0.02	11
ASS16_2.0	2	2.1	CALCRETE: red-brown-white, mottled, calcareous with dark grey bands of	26/01/2022	EP2201334012		-	-	-	-	-	-	-	-	-	-	<0.005	<10	15300	24.5	-	-	<0.02	<10
ASS16_3.0	3	3.1		26/01/2022	EP2201334013		-	-	-	-	-	-	-	-	-	-	<0.005	<10	7840	11.3	-	-	<0.02	<10
ASS17_0.0	0	0.1	Clayey SAND: brown, medium grained, pieces of granophyre	26/01/2022	EP2201334014		-	-	-	-	-	-	-	-	-	-	<0.005	<10	5620	9.01	-	-	<0.02	<10
ASS17_0.5	0.5	0.6	CALCRETE, pink-brown to white, mottled appearance, calcareous with fragments of granophyre	26/01/2022	EP2201334015		9.7	8.4	<2	<2	<2	<0.005	<0.005	<0.005	<0.005	0.007	0.006	<5	-	-	7600	12.2	<0.02	<10
ASS18_0.0	0	0.1	CLAY: brown, high plasticity, fragments of calcrete	25/01/2022	EP2201417017		-	-	-	-	-	-	-	-	-	-	<0.005	<10	9880	15.8	-	-	<0.02	<10
ASS18_0.25	0.25	0.35		25/01/2022	EP2201247001		-	-	-	-	-	-	-	-	-	-	<0.005	<10	9770	15.7	-	-	<0.02	<10
ASS18_0.5	0.5	0.6		25/01/2022	EP2201417018		9.5	8.1	<2	<2	<2	<0.005	<0.005	<0.005	0.082	0.108	0.026	16	-	-	9310	8.6	0.03	16
ASS18_0.75	0.75	0.85		25/01/2022	EP2201247002		9.7	8	<2	<2	<2	<0.005	<0.005	<0.005	0.046	0.058	0.011	7	-	-	12100	19.3	<0.02	<10
ASS18_1.5	1.5	1.6		25/01/2022	EP2201417019		-	-	-	-	-	-	-	-	-	-	<0.005	<10	13300	21.4	-	-	<0.02	<10
ASS19_0.5	0.5	0.6	Sandy CLAY: pink-brown, fine grained	27/01/2022	EP2201332001		8.7	8.4	<2	<2	<2	<0.005	<0.005	<0.005	<0.005	0.005	0.005	<5	-	-	461	0.739	<0.02	<10
ASS20_0.0	0	0.1	SAND: brown, moderately sorted with minor shell fragments	27/01/2022	EP2201332002		9.4	8.4	<2	<2	<2	<0.005	<0.005	<0.005	0.116	0.159	0.043	27	-	-	9570	8.92	0.04	27
ASS20_1.5	1.5	1.6	Sandy CLAY: brown, fine grained, moderate plasticity	27/01/2022	EP2201332003		-	-	-	-	-	-	-	-	-	-	0.006	<10	8360	13.4	-	-	<0.02	<10
ASS20_2.0	2	2.1	Calcretised GRANOPHYRE: grey, inclusions of calcrete	27/01/2022	EP2201332004		-	-	-	-	-	-	-	-	-	-	<0.005	<10	9170	8.29	-	-	<0.02	<10
ASS21_0.0	0	0.1	Sandy GRAVEL: coarse, brown, grey, sub angular, well sorted, with calcrete and granophore	28/01/2022	EP2201330001		9.4	8.3	<2	<2	<2	<0.005	<0.005	<0.005	0.129	0.189	0.06	37	-	-	7900	12	0.06	37
ASS22_0.0	0	0.1	Sandy GRAVEL with calcrete: brown, coarse, well sorted, sub-angular	12/02/2022	EP2201953001		-	-	-	-	-	-	-	-	-	-	<0.005	<10	320	0.51	-	-	<0.02	<10
ASS22_0.5	0.5	0.6	Sandy CLAY: coarse, white/grey, well sorted,	12/02/2022	EP2201953002		9.1	9.5	<2	<2	<2	<0.005	<0.005	<0.005	0.005	0.012	0.007	<5	-	-	1220	1.96	<0.02	<10
ASS22_1.0	1	1.1	sub-rounded, with some gravel (calcrete)	12/02/2022	EP2201953003		-	-	-	-	-	-	-	-	-	-	0.005	<10	1520	2.43	-	-	<0.02	<10
QC07	1	1.1	GRANOPHYRE: grey, X-stalline, fresh in nature	25/01/2022	EP2201247019		9.4	7.9	<2	<2	<2	<0.005	<0.005	<0.005	0.016	0.016	<0.005	<5	-	-	289	0.463	<0.02	<10
QC09	0.5	0.6	Sandy GRAVELS: red-brown, poorly sorted with sub-angular to sub-rounded grains of calcrete and granophyre, shell fragments present	25/01/2022	EP2201247020		9.6	8	<2	<2	<2	<0.005	<0.005	<0.005	0.291	0.389	0.097	61	-	-	7690	12.3	0.1	61
QC15	0.5	0.6	CALCRETE: pink-brown to white, mottled appearance, calcareous with fragments of granophore	26/01/2022	EP2201334016		9.6	8.4	<2	<2	<2	<0.005	<0.005	<0.005	<0.005	0.007	0.006	<5	-	-	7010	11.2	<0.02	<10
QC28	0.5	0.6	Sandy SILT: fine, brown, sub-rounded to sub-angular, well sorted, with granophyre	28/01/2022	EP2201330013		-	-	-	-	-	-	-	-	-	-	0.006	<10	183	0.29	-	-	<0.02	<10

Table 1
Groundwater Analytical Results
Perdaman Urea Project
754-PEREN296568

TETRA TECH COFFEY

ChemName	output unit	LOR	ASS DWER ASS (2015)	Ecological ANZG (2018) Marine Water 95% LOSP Toxicant DGVs	BH12	BH22	BH27	BH31	MW01	MW02	MW03	MW05	MW06	MW07-2	MW08	MW09
					09-Feb-22	09-Feb-22	21-Feb-22	10-Feb-22	09-Feb-22	21-Feb-22	21-Feb-22	10-Feb-22	10-Feb-22	10-Feb-22	09-Feb-22	21-Feb-22
					EP2201691009	EP2201691007	EP2202113003	EP2201691008	EP2201691001	EP2202113002	EP2202113001	EP2201691003	EP2201691004	EP2201691018	EP2201691005	EP2202113008
					EP2201691	EP2201691	EP2202113	EP2201691	EP2201691	EP2202113	EP2202113	EP2201691	EP2201691	EP2201691	EP2201691	EP2202113
Physical Parameters																
Electrical Conductivity @ 25C (lab)	µS/cm	1	NE	NE	180,000	6680	190,000	-	12,500	177,000	122,000	-	-	-	162,000	135,000
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	166,000	4820	183,000	-	7800	177,000	108,000	-	-	-	139,000	124,000
pH (lab)	pH_unit	0.01	<5	NE	7.2	7.76	7.1	-	7.52	7.26	7.54	-	-	-	7.5	7.35
Alkalinity			NE	NE												
Alkalinity (total as CaCO3)	mg/L	1	60	NE	105	563	73	-	463	60	117	-	-	-	131	97
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	<1	<1	<1	-	<1	<1	<1	-	-	-	<1	<1
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	<1	<1	<1	-	<1	<1	<1	-	-	-	<1	<1
Ions																
Calcium (Filtered)	mg/L	1	NE	NE	1440	169	1490	-	350	1250	772	-	-	-	1500	1190
Cl:SO4	mg/L	-	<2	NE	13	24	15	-	276	12	9	-	-	-	9	10
Chloride	mg/L	1	NE	NE	84,900	2060	100,000	-	3860	86,900	50,900	-	-	-	70,700	62,600
Sulfate as SO4 - Turbidimetric	mg/L	1	NE	NE	6,500	87	6,880	-	14	7,270	5,580	-	-	-	8,050	6,440
Potassium (Filtered)	mg/L	1	NE	NE	1800	53	2160	-	25	1830	1260	-	-	-	1540	1430
Sodium (Filtered)	mg/L	1	NE	NE	48,400	1120	61,500	-	1740	51,000	33,200	-	-	-	42,500	41,400
Ionic Balance	%	0.01	NE	NE	2.38	1.04	5.34	-	1.22	3.16	6.53	-	-	-	4.4	8.51
Anions Total	meq/L	0.01	NE	NE	2530	71.2	2960	-	118	2600	1550	-	-	-	2160	1900
Cations Total	meq/L	0.01	NE	NE	2660	72.7	3300	-	121	2770	1770	-	-	-	2360	2260
Inorganics																
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	NE	NE	105	563	73	-	463	60	117	-	-	-	131	97
Total Phosphorus as P (Organic Phosphate as P)	mg/L	0.01	NE	NE	0.06	0.28	0.46	0.86	-	0.08	0.11	0.08	0.06	-	0.85	0.39
Nutrients																
Ammonia as N	mg/L	0.01	NE	0.91	0.74	3.73	0.07	0.13	-	<0.05	<0.05	<0.01	9.19	-	0.74	<0.05
Nitrite + Nitrate as N	mg/L	0.01	NE	NE	<0.01	0.02	1.24	<0.01	-	0.94	0.19	<0.01	0.83	-	5.54	0.07
Nitrate (as NO3-N)	mg/L	0.01	NE	NE	<0.01	0.02	1.22	<0.01	-	0.92	0.18	<0.01	0.2	-	5.48	0.05
Nitrite (as NO2-N)	mg/L	0.01	NE	NE	<0.01	<0.01	0.02	<0.01	-	0.02	0.01	<0.01	0.63	-	0.06	0.02
Nitrogen (Total)	mg/L	0.1	NE	NE	2.4	61.1	2.8	63	-	2.3	0.9	0.5	11.9	-	9.5	1.4
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1	NE	NE	2.4	61.1	1.6	63	-	1.4	0.7	0.5	11.1	-	4	1.3
Metals																
Magnesium (Filtered)	mg/L	1	NE	NE	5260	172	6020	-	335	5420	3120	-	-	-	4870	4360
Arsenic	mg/L	0.001	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (Filtered)	mg/L	0.001	NE	NE	<0.02	0.004	<0.02	0.002	0.005	<0.02	<0.02	0.003	0.001	<0.02	<0.02	<0.02
Cadmium	mg/L	0.0001	NE	0.0055	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Filtered)	mg/L	0.0001	NE	0.0055	<0.002	<0.0001	<0.002	<0.0001	<0.0001	<0.002	<0.002	<0.0001	0.0002	<0.002	<0.002	<0.002
Chromium (III+VI)	mg/L	0.001	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (III+VI) (Filtered)	mg/L	0.001	NE	NE	<0.02	<0.001	<0.02	<0.001	<0.001	<0.02	<0.02	<0.001	<0.001	<0.02	<0.02	<0.02
Copper	mg/L	0.001	NE	0.0013	-	-	-	-	-	-	-	-	-	-	-	-
Copper (Filtered)	mg/L	0.001	NE	0.0013	<0.02	<0.001	<0.02	0.01	<0.001	<0.02	<0.02	<0.001	<0.001	<0.02	<0.02	<0.02
Lead	mg/L	0.001	NE	0.0044	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Filtered)	mg/L	0.001	NE	0.0044	<0.02	<0.001	<0.02	<0.001	<0.001	<0.02	<0.02	<0.001	<0.001	<0.02	<0.02	<0.02
Mercury	mg/L	0.00004	NE	0.0004	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (Filtered)	mg/L	0.00004	NE	0.0004	<0.0002	<0.00004	<0.0002	<0.00004	<0.00004	<0.0002	<0.0002	<0.00004	<0.00004	<0.00004	<0.0002	<0.0002
Nickel	mg/L	0.001	NE	0.07	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (Filtered)	mg/L	0.001	NE	0.07	<0.02	0.004	<0.02	0.028	0.003	<0.02	<0.02	0.003	0.005	<0.02	<0.02	<0.02
Zinc	mg/L	0.005	NE	0.015	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (Filtered)	mg/L	0.005	NE	0.015	<0.1	0.009	<0.1	0.008	<0.005	<0.1	<0.1	<0.005	0.035	<0.1	<0.1	<0.1
Aluminium (Filtered)	mg/L	0.01	>1	NE	<0.2	0.05	<0.2	-	<0.01	<0.2	<0.2	-	-	-	<0.2	<0.2
Iron (Filtered)	mg/L	0.05	NE	NE	8.39	5.39	<1	-	15.8	<1	<1	-	-	-	<1	<1
Manganese (Filtered)	mg/L	0.001	NE	NE	14.5	5.74	0.657	-	17.4	0.033	<0.02	-	-	-	0.39	1.35
Other																
Acidity (as CaCO3)	mg/L	1	40	NE	53	32	36	-	53	30	27	-	-	-	45	32

Table 1
Groundwater Analytical Results
Perdaman Urea Project
754-PEREN296568

					MW10
					09-Feb-22
					EP2201691006
					EP2201691
			ASS	**Ecological**	
			DWER ASS (2015)	ANZG (2018) Marine Water 95% LOSP Toxicant DGVs	
ChemName	**output unit**	**LOR**			
Physical Parameters					
Electrical Conductivity @ 25C (lab)	µS/cm	**1**	NE	NE	**8930**
Total Dissolved Solids (TDS)	mg/L	**10**	NE	NE	**5160**
pH (lab)	pH_unit	**0.01**	**<5**	NE	**8.31**
Alkalinity			NE	NE	
Alkalinity (total as CaCO3)	mg/L	**1**	**60**	NE	**344**
Alkalinity (Hydroxide) as CaCO3	mg/L	**1**	NE	NE	<1
Carbonate Alkalinity as CaCO3	mg/L	**1**	NE	NE	<1
Ions					
Calcium (Filtered)	mg/L	**1**	NE	NE	**30**
Cl:SO4	mg/L	**-**	**<2**	NE	**8**
Chloride	mg/L	**1**	NE	NE	**2590**
Sulfate as SO4 - Turbidimetric	mg/L	**1**	NE	NE	**342**
Potassium (Filtered)	mg/L	**1**	NE	NE	**94**
Sodium (Filtered)	mg/L	**1**	NE	NE	**1690**
Ionic Balance	%	**0.01**	NE	NE	**1.4**
Anions Total	meq/L	**0.01**	NE	NE	**87**
Cations Total	meq/L	**0.01**	NE	NE	**84.6**
Inorganics					
Alkalinity (Bicarbonate as CaCO3)	mg/L	**1**	NE	NE	**344**
Total Phosphorus as P (Organic Phosphate as P)	mg/L	**0.01**	NE	NE	**0.02**
Nutrients					
Ammonia as N	mg/L	**0.01**	NE	**0.91**	<0.01
Nitrite + Nitrate as N	mg/L	**0.01**	NE	NE	**9.17**
Nitrate (as NO3-N)	mg/L	**0.01**	NE	NE	**9.16**
Nitrite (as NO2-N)	mg/L	**0.01**	NE	NE	0.01
Nitrogen (Total)	mg/L	**0.1**	NE	NE	**9.8**
Total Kjeldahl Nitrogen (TKN)	mg/L	**0.1**	NE	NE	**0.6**
Metals					
Magnesium (Filtered)	mg/L	**1**	NE	NE	**88**
Arsenic	mg/L	**0.001**	NE	NE	**-**
Arsenic (Filtered)	mg/L	**0.001**	NE	NE	<0.001
Cadmium	mg/L	**0.0001**	NE	**0.0055**	**-**
Cadmium (Filtered)	mg/L	**0.0001**	NE	**0.0055**	<0.0001
Chromium (III+VI)	mg/L	**0.001**	NE	NE	**-**
Chromium (III+VI) (Filtered)	mg/L	**0.001**	NE	NE	<0.001
Copper	mg/L	**0.001**	NE	**0.0013**	**-**
Copper (Filtered)	mg/L	**0.001**	NE	**0.0013**	<0.001
Lead	mg/L	**0.001**	NE	**0.0044**	**-**
Lead (Filtered)	mg/L	**0.001**	NE	**0.0044**	<0.001
Mercury	mg/L	**0.00004**	NE	**0.0004**	**-**
Mercury (Filtered)	mg/L	**0.00004**	NE	**0.0004**	<0.00004
Nickel	mg/L	**0.001**	NE	**0.07**	**-**
Nickel (Filtered)	mg/L	**0.001**	NE	**0.07**	<0.001
Zinc	mg/L	**0.005**	NE	**0.015**	**-**
Zinc (Filtered)	mg/L	**0.005**	NE	**0.015**	<0.005
Aluminium (Filtered)	mg/L	**0.01**	**>1**	NE	**0.02**
Iron (Filtered)	mg/L	**0.05**	NE	NE	<0.05
Manganese (Filtered)	mg/L	**0.001**	NE	NE	<0.001
Other					
Acidity (as CaCO3)	mg/L	**1**	**40**	NE	<1

Field Blanks (Water)

Lab Report Number	EP2200878	EP2200878	EP2200878
Field ID	QC1	QC2	TBW44
Sampled_Date/Time	1/24/2022 12:30	1/24/2022	1/24/2022
Sample Type	Rinsate	Field_B	Trip_B

ChemName	Units	EQL			
BTEX					
Benzene	µg/L	1	<1	<1	
Toluene	µg/L	2	<2	<2	
Ethylbenzene	µg/L	2	<2	<2	
Xylene (m & p)	µg/L	2	<2	<2	
Xylene (o)	µg/L	2	<2	<2	
Xylene Total	µg/L	2	<2	<2	
Total BTEX	µg/L	1	<1	<1	
Metals					
Arsenic	mg/l	0.001	<0.001		
Cadmium	mg/l	0.0001	<0.0001		
Chromium (III+VI)	mg/l	0.001	<0.001		
Copper	mg/l	0.001	<0.001		
Lead	mg/l	0.001	<0.001		
Mercury	mg/l	0.0001	<0.0001		
Nickel	mg/l	0.001	<0.001		
Zinc	mg/l	0.005	<0.005		
OCP					
4,4-DDE	µg/L	0.5	<0.5		
a-BHC	µg/L	0.5	<0.5		
Aldrin	µg/L	0.5	<0.5		
Aldrin + Dieldrin	µg/L	0.5	<0.5		
b-BHC	µg/L	0.5	<0.5		
chlordane	µg/L	0.5	<0.5		
d-BHC	µg/L	0.5	<0.5		
DDD	µg/L	0.5	<0.5		
DDT	µg/L	2	<2		
Dieldrin	µg/L	0.5	<0.5		
Endosulfan I	µg/L	0.5	<0.5		
Endosulfan II	µg/L	0.5	<0.5		
Endosulfan sulphate	µg/L	0.5	<0.5		
Endrin	µg/L	0.5	<0.5		
Endrin aldehyde	µg/L	0.5	<0.5		
Endrin ketone	µg/L	0.5	<0.5		
g-BHC (Lindane)	µg/L	0.5	<0.5		
Heptachlor	µg/L	0.5	<0.5		
DDT+DDE+DDD	µg/L	0.5	<0.5		
Heptachlor epoxide	µg/L	0.5	<0.5		
Hexachlorobenzene	µg/L	0.5	<0.5		
Methoxychlor	µg/L	2	<2		
Organochlorine Pesticides					
Chlordane (cis)	µg/L	0.5	<0.5		
Chlordane (trans)	µg/L	0.5	<0.5		
Organophosphorous Pesticides					
Azinophos methyl	µg/L	0.5	<0.5		
Bromophos-ethyl	µg/L	0.5	<0.5		
Carbophenothion	µg/L	0.5	<0.5		
Chlorfenvinphos	µg/L	0.5	<0.5		
Chlorpyrifos	µg/L	0.5	<0.5		
Chlorpyrifos-methyl	mg/l	0.0005	<0.0005		
Diazinon	µg/L	0.5	<0.5		
Dichlorvos	µg/L	0.5	<0.5		
Dimethoate	µg/L	0.5	<0.5		
Ethion	µg/L	0.5	<0.5		
Fenthion	µg/L	0.5	<0.5		
Malathion	µg/L	0.5	<0.5		
Methyl parathion	µg/L	2	<2		
Monocrotophos	µg/L	2	<2		
Prothiofos	µg/L	0.5	<0.5		
Other					
Diethanolamine	mg/l	0.001	<0.001		
Ethanolamine	mg/l	0.001	<0.001		
Methyldiethanolamine	mg/l	0.001	<0.001		
PAH					
Acenaphthene	µg/L	1	<1		
Acenaphthylene	µg/L	1	<1		
Anthracene	µg/L	1	<1		
Benz(a)anthracene	µg/L	1	<1		
Benzo(a) pyrene	µg/L	0.5	<0.5		
Benzo(g,h,i)perylene	µg/L	1	<1		
Benzo(k)fluoranthene	µg/L	1	<1		
Chrysene	µg/L	1	<1		
Benzo(b+j)fluoranthene	µg/L	1	<1		
Dibenz(a,h)anthracene	µg/L	1	<1		
Fluoranthene	µg/L	1	<1		
Fluorene	µg/L	1	<1		
Indeno(1,2,3-c,d)pyrene	µg/L	1	<1		
Phenanthrene	µg/L	1	<1		
Pyrene	µg/L	1	<1		
PAHs (Sum of total)	µg/L	0.5	<0.5		
PCBs					
PCBs (Sum of total)	µg/L	1	<1		

Field Blanks (Water)

		Lab Report Number	EP2200878	EP2200878	EP2200878
		Field ID	QC1	QC2	TBW44
		Sampled_Date/Time	1/24/2022 12:30	1/24/2022	1/24/2022
		Sample Type	Rinsate	Field_B	Trip_B
Perfluoroalkane Carboxylic Acids					
Perfluorobutanoic acid (PFBA)	µg/L	0.002	<0.1		<0.002
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	<0.02		<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	<0.02		<0.0005
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	<0.02		<0.0005
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	<0.01		<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005	<0.02		<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	<0.02		<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	<0.02		<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	<0.02		<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	<0.02		<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	<0.05		<0.0005
Perfluoroalkane Sulfonic Acids					
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	<0.02		<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	<0.02		<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	<0.01		<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	<0.02		<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	<0.01		<0.0002
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	<0.02		<0.0005
Perfluoroalkyl Sulfonamides					
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	<0.02		<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	<0.05		<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	<0.05		<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	<0.02		<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	<0.02		<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	<0.05		<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	<0.05		<0.001
(n:2) Fluorotelomer Sulfonic Acids					
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	<0.05		<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	<0.05		<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	<0.05		<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	<0.05		<0.001
Pesticides					
Demeton-S-methyl	µg/L	0.5	<0.5		
Fenamiphos	µg/L	0.5	<0.5		
Parathion	µg/L	2	<2		
Pirimphos-ethyl	µg/L	0.5	<0.5		
PFAS					
Sum of PFAS (WA DER List)_	µg/L	0.0002	<0.01		<0.0002
Sum of PFHxS and PFOS	µg/L	0.0002	<0.01		<0.0002
Sum of PFAS	µg/L	0.0002	<0.01		<0.0002
Polycyclic Aromatic Hydrocarbons					
Naphthalene	µg/L	1	<5	<5	
Benzo(a)pyrene TEQ calc (Zero)	µg/L	0.5	<0.5		
Total Recoverable Hydrocarbons					
C10 - C40 (Sum of total)	mg/l	0.1	<0.1	<0.1	
TPH					
F1 (C6-C10) less BTEX	mg/l	0.02	<0.02	<0.02	
F2 C10-C16 (minus Naphthalene)	mg/l	0.1	<0.1	<0.1	
C6 - C9	mg/l	0.02	<0.02	<0.02	
C10 - C14	mg/l	0.05	<0.05	<0.05	
C15 - C28	mg/l	0.1	<0.1	<0.1	
C29-C36	mg/l	0.05	<0.05	<0.05	
+C10 - C36 (Sum of total)	mg/l	0.05	<0.05	<0.05	
F1 (C6-C10_)	mg/l	0.02	<0.02	<0.02	
F2 (C10-C16 Hydrocarbons)	mg/l	0.1	<0.1	<0.1	
F3 (C16-C34 Hydrocarbons)	mg/l	0.1	<0.1	<0.1	
C34-C40	mg/l	0.1	<0.1	<0.1	

Contents

Lab Duplicates with high RPDs

SDG	Lab_Report_Number	Matrix_Type	Lab_Duplicate	Field_ID	Depth	Sampled_Date_Time	Method_Name	Compound	Parent_Result	Dupe_Result	Result_Unit	EQL	RPD
	EP2200878	Water	QC-MRG2-4142721005 EP2200878			1/20/2022	EG020T: Total Metals by ICP-MS	Arsenic	0.002	<0.001	mg/L	0.001 mg/L	66
	EP2200878	Water	QC-MRG2-4142721005 EP2200878			1/20/2022	EG020T: Total Metals by ICP-MS	Chromium	0.002	0.001	mg/L	0.001 mg/L	66

Field Duplicates (Soil)

Lab Report Number			EP2201247	EP2201247		EP2201417	EP2201417		EP2201247	EP2201247		EP2201334	EP2201334		EP2201330	EP2201330	
Field ID			ASS11_1.0	QC7	RPD	ASS11_1.0	QC7	RPD	ASS12_0.5	QC9	RPD	ASS17_0.5	QC15	RPD	ASS5_0.5	QC28	RPD
Sampled Date/Time			1/25/2022 15:00	1/25/2022 15:00		1/25/2022 15:11	1/25/2022 15:11		1/25/2022 15:00	1/25/2022 15:00		1/26/2022 15:00	1/26/2022 15:00		1/28/2022 15:00	1/28/2022 15:00	
ChemName	**Units**	**LOR**															
Liming rate without ANCE	KG CACO3/T	1	<1	<1	0	<1	<1	0	4	5	22	<1	<1	0	<1	<1	0
Ions																	
Magnesium in Peroxide	%	0.005	**0.147**	**0.076**	**64**				**1.11**	**1.55**	**33**	**0.871**	**0.586**	**39**			
SPOCAS																	
Titratable Peroxide Acidity	mole H+/t	2	<2	<2	0				<2	<2	0	<2	<2	0			
Acid Neutralising Capacity	%CaCO3	0.01				**2.75**	**2**	**32**							**0.34**	**0.92**	**92**
Acid Reacted Calcium	%	0.005	**0.703**	**0.332**	**72**				16.2	13	22	13.5	12.2	10			
Acid Reacted Magnesium	%	0.005	**0.114**	**0.049**	**80**				0.99	1.33	29	**0.824**	**0.547**	**40**			
acidity - Acid Reacted Calcium	mole H+/t	5	**351**	**166**	**72**				8100	6490	22	6720	6110	10			
acidity - Acid Reacted Magnesium	mole H+/t	5	**94**	**40**	**81**				814	1090	29	**677**	**450**	**40**			
acidity - Excess Acid Neutralising Capacity	mole H+/t	10	**574**	**289**	**66**				8650	7690	12	7600	7010	8			
acidity - Peroxide Oxidisable Sulfur	mole H+/t	5	<5	<5	0				59	61	3	<5	<5	0			
ANC Fineness Factor	-	0.5	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0	1.5	1.5	0
ANCBT	mole H+/t	10				**549**	**400**	**31**							**67**	**183**	**93**
Calcium in Peroxide	%	0.005	**0.794**	**0.441**	**57**				16.4	13.3	21	13.7	12.4	10			
Chromium Reducible Sulfur	%S	0.005				<0.005	<0.005	0							0.005	0.006	18
Chromium Reducible Sulphur	mole H+/t	10				<10	<10	0							<10	<10	0
KCl Extractable Calcium	%	0.005	0.091	0.109	18				0.206	0.275	29	0.196	0.203	4			
KCl Extractable Magnesium	%	0.005	0.034	0.028	19				**0.123**	**0.227**	**59**	0.047	0.039	19			
KCl Extractable Sulfur	%	0.005	0.02	0.016	22				**0.13**	**0.291**	**76**	<0.005	<0.005	0			
Liming Rate	KG CACO3/T	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Net Acidity (acidity units)	mole H+/t	10	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0	<10	<10	0
Net Acidity (sulfur units)	%S	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
Peroxide Oxidisable Sulfur	%	0.005	<0.005	<0.005	0				0.094	0.097	3	0.006	0.006	0			
pH (KCl)	-	0.1	9.6	9.4	2	9.6	9.4	2	9.7	9.6	1	9.7	9.6	1	7.4	8.3	11
pH (Ox)	-	0.1	7.8	7.9	1				8.1	8	1	8.4	8.4	0			
sulfidic - Acid Reacted Magnesium	%S	0.005	**0.15**	**0.064**	**80**				1.3	1.75	30	**1.09**	**0.722**	**41**			
sulfidic - Excess Acid Neutralising Capacity	%S	0.02	**0.919**	**0.463**	**66**				13.8	12.3	11	12.2	11.2	9			
sulfidic - Titratable Actual Acidity	%S	0.02				<0.02	<0.02	0							<0.02	<0.02	0
sulfidic - Titratable Actual Acidity	%S	0.005	<0.005	<0.005	0				<0.005	<0.005	0	<0.005	<0.005	0			
sulfidic - Titratable Peroxide Acidity	%S	0.005	<0.005	<0.005	0				<0.005	<0.005	0	<0.005	<0.005	0			
sulfidic - Titratable Sulfidic Acidity	%S	0.005	<0.005	<0.005	0				<0.005	<0.005	0	<0.005	<0.005	0			
sulfidic-Acid Neutral	%S	0.01				**0.88**	**0.64**	**32**							**0.11**	**0.29**	**90**
Sulfur in Peroxide	%	0.005	**0.022**	**0.016**	**32**				**0.224**	**0.389**	**54**	0.007	0.007	0			
Titratable Actual Acidity	mole H+/t	2	<2	<2	0	<2	<2	0	<2	<2	0	<2	<2	0	<2	<2	0
Titratable Sulfidic Acidity	mole H+/t	2	<2	<2	0				<2	<2	0	<2	<2	0			

*RPDs have only been considered where a concentration is greater than 0 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (0-10 x EQL); 30 (10-30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Contents

Lab Duplicates with high RPDs

SDG	Lab_Report_Number	Matrix_Type	Lab_Duplicate	Field_ID	Depth	Sampled_Date_Time	Method_Name	Compound	Parent_Result	Dupe_Result	Result_Unit	EQL	RPD
	EP2201691	Water	QC-MRG2-4176286018 EP2201691			2/14/2022	EG020F: Dissolved Metals by ICP-MS	Chromium	0.001	0.002	mg/L	0.001 mg/L	66
	EP2202113	Water	QC-MRG3-4193079005 EP2202113			2/20/2022	EG020F: Dissolved Metals by ICP-MS	Iron	0.12	0.06	mg/L	0.05 mg/L	66

Field Duplicates (Water)
Filter: Lab_Report_Number in('EP2202113','EP2201691')

Lab Report Number			EP2201691	EP2201691		EP2201691	Interlab_D		EP2201691	EP2201691		EP2201691	Interlab_D		EP2202113	EP2202113		EP2202113	Interlab_D	
Field ID			MW010	QC01	RPD	MW08	QC02	RPD	MW08	QC06	RPD	MW010	QC07	RPD	MW03	QC1	RPD	MW03	QC2	RPD
Sampled Date/Time			2/9/2022 15:00	2/9/2022 15:00		2/9/2022 15:00	2/9/2022 15:00		2/9/2022 15:00	2/9/2022 15:00		2/9/2022 15:00	2/9/2022 15:00		2/21/2022 15:00	2/21/2022 15:00		2/21/2022 15:00	2/21/2022 15:00	
ChemName	**Units**	**LOR**																		
Physical Parameters																				
Electrical Conductivity @ 25C (lab)	µS/cm	1 : 10 (Interlab)	8930	9010	1	**162000**	**8800**	**179**	162000	145000	11	**8930**	**140000**	**176**	122000	121000	1	122000	110000	10
Total Dissolved Solids (TDS)	mg/l	10	5160	5010	3	**139000**	**4700**	**187**	139000	130000	7	**5160**	**130000**	**185**	108000	106000	2	108000	120000	11
pH (lab)	pH unit	0.01 : 0.1 (Interlab)	8.31	8.36	1	7.5	8.3	10	7.5	7.52	0	8.31	7.5	10	7.54	7.58	1	7.54	7.6	1
Alkalinity																				
Alkalinity (total as CaCO3)	mg/l	1 : 20 (Interlab)	344	348	1	**131**	**370**	**95**	131	120	9	**344**	**130**	**90**	117	121	3	117	130	11
Alkalinity (Hydroxide) as CaCO3	mg/l	1	<1	<1	0	<1			<1	<1	0	<1			<1	<1	0	<1		
Carbonate Alkalinity as CaCO3	mg/l	1	**<1**	**8**	**156**	<1			<1	<1	0	<1			<1	<1	0	<1		
Ions																				
Calcium (Filtered)	mg/l	1	30	29	3	1500			1500	1460	3	30			772	782	1	772		
Chloride	mg/l	1	2590	2570	1	**70700**	**2600**	**186**	70700	68800	3	**2590**	**61000**	**184**	50900	51500	1	**50900**	**37000**	**32**
Potassium (Filtered)	mg/l	1	94	94	0	1540			1540	1460	5	94			1260	1280	2	1260		
Sodium (Filtered)	mg/l	1	1690	1700	1	42500			42500	39800	7	1690			33200	31900	4	33200		
Ionic Balance	%	0.01	**1.4**	**0.81**	**53**	4.4			**4.4**	**2.54**	**54**	1.4			**6.53**	**4.32**	**41**	6.53		
Anions Total	meq/L	0.01	87	86.5	1	2160			2160	2100	3	87			1550	1570	1	1550		
Cations Total	meq/L	0.01	84.6	85.1	1	2360			2360	2210	7	84.6			1770	1710	3	1770		
Nutrients																				
Ammonia as N	mg/l	0.01 : 0.02 (Interlab)	**<0.01**	**0.09**	**160**	**0.74**	**<0.01**	**195**	0.74	0.55	29	**<0.01**	**1.3**	**197**	<0.05	<0.05	0	**<0.05**	**<0.02 - 0.91**	**179**
Nitrite + Nitrate as N	mg/l	0.01 : 0.05 (Interlab)	9.17	9.17	0	**5.54**	**8.9**	**47**	5.54	6.22	12	**9.17**	**6.1**	**40**	0.19	0.2	5	0.19	0.17 - 0.24	23
Nitrate (as NO3-N)	mg/l	0.01 : 0.02 (Interlab)	9.16	9.17	0	**5.48**	**8.9**	**48**	5.48	6.2	12	**9.16**	**6.1**	**40**	0.18	0.2	11	0.18	0.22	20
Nitrite (as NO2-N)	mg/l	0.01 : 0.02 (Interlab)	0.01	<0.01	0	**0.06**	**<0.02**	**100**	**0.06**	**0.02**	**100**	0.01	<0.02	0	0.01	<0.01	0	**0.01**	**0.02**	**67**
Nitrogen (Total)	mg/l	0.1 : 0.2 (Interlab)	9.8	9.8	0	9.5			9.5	8.2	15	9.8			0.9	1	11	**0.9**	**0.37**	**83**
Total Kjeldahl Nitrogen (TKN)	mg/l	0.1 : 0.2 (Interlab)	0.6	0.6	0	4			**4**	**2**	**67**	0.6			0.7	0.8	13	**0.7**	**0.2**	**111**
OCP																				
4,4-DDE	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
a-BHC	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
Aldrin	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
Aldrin + Dieldrin	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
b-BHC	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
chlordane	µg/L	0.5 : 2 (Interlab)													<0.5	<0.5	0	<0.5	<2	0
d-BHC	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
DDD	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
DDT	µg/L	2 : 0.2 (Interlab)													<2	<2	0	<2	<0.2	0
Dieldrin	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
Endosulfan I	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
Endosulfan II	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
Endosulfan sulphate	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
Endrin	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
Endrin aldehyde	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
Endrin ketone	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
g-BHC (Lindane)	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
Heptachlor	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
DDT+DDE+DDD	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
Heptachlor epoxide	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
Hexachlorobenzene	µg/L	0.5 : 0.2 (Interlab)													<0.5	<0.5	0	<0.5	<0.2	0
Methoxychlor	µg/L	2 : 0.2 (Interlab)													<2	<2	0	<2	<0.2	0
PAH																				
Acenaphthene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Acenaphthylene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Anthracene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Benz(a)anthracene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Benzo(a) pyrene	µg/L	0.5 : 1 (Interlab)	<0.5	<0.5	0	<0.5	<1	0	<0.5	<0.5	0	<0.5	<1	0	<0.5	<0.5	0	<0.5	<1	0
Benzo(g,h,i)perylene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Benzo(k)fluoranthene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Chrysene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Benzo(b+j)fluoranthene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Dibenz(a,h)anthracene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Fluoranthene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Fluorene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Indeno(1,2,3-c,d)pyrene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Phenanthrene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Pyrene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
PAHs (Sum of total)	µg/L	0.5 : 1 (Interlab)	<0.5	<0.5	0	<0.5	<1	0	<0.5	<0.5	0	<0.5	<1	0	<0.5	<0.5	0	<0.5	<1	0
Inorganics																				
Alkalinity (Bicarbonate as CaCO3)	mg/l	1	344	340	1	131			131	120	9	344			117	121	3	117		
Total Phosphorus as P (Organic Phosphate as P)	mg/l	0.01	0.02	0.02	0	0.85			**0.85**	**0.08**	**166**	0.02			0.11	0.11	0	0.11		
Metals																				
Magnesium (Filtered)	mg/l	1	88	89	1	4870			4870	4530	7	88			3120	3100	1	3120		
Arsenic (Filtered)	mg/l	0.001	<0.001	<0.001	0	<0.02	<0.001	0	<0.02	<0.02	0	<0.001	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
Cadmium (Filtered)	mg/l	0.0001 : 0.0002 (Interlab)	<0.0001	<0.0001	0	<0.002	<0.0002	0	<0.002	<0.002	0	<0.0001	<0.01	0	<0.002	<0.002	0	<0.002	<0.01	0
Chromium (III+VI) (Filtered)	mg/l	0.001	<0.001	<0.001	0	<0.02	<0.001	0	<0.02	<0.02	0	<0.001	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
Copper (Filtered)	mg/l	0.001	<0.001	<0.001	0	<0.02			<0.02	<0.02	0	<0.001			<0.02	<0.02	0	<0.02		
Lead (Filtered)	mg/l	0.001	<0.001	<0.001	0	<0.02			<0.02	<0.02	0	<0.001			<0.02	<0.02	0	<0.02		
Mercury (Filtered)	mg/l	4e-005	<0.00004	<0.00004	0	<0.0002			<0.0002	<0.0002	0	<0.00004			<0.0002	<0.0002	0	<0.0002		
Nickel (Filtered)	mg/l	0.001	<0.001	<0.001	0	<0.02	<0.001	0	<0.02	<0.02	0	<0.001	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
Zinc (Filtered)	mg/l	0.005	<0.005	<0.005	0	<0.1	<0.005	0	<0.1	<0.1	0	<0.005	<0.25	0	<0.1	<0.1	0	<0.1	<0.25	0
Aluminium (Filtered)	mg/l	0.01 : 0.05 (Interlab)	0.02	0.02	0	<0.2	<0.05	0	<0.2	<0.2	0	0.02	<2.5	0	<0.2	<0.2	0	<0.2	<2.5	0
Iron (Filtered)	mg/l	0.05	<0.05	<0.05	0	<1	<0.05	0	<1	<1	0	<0.05	<2.5	0	<1	<1	0	<1	<2.5	0
Manganese (Filtered)	mg/l	0.001 : 0.005 (Interlab)	<0.001	0.001	0	**0.39**	**<0.005**	**195**	**0.39**	**0.069**	**140**	<0.001	<0.25	0	<0.02	<0.02	0	<0.02	<0.25	0
Perfluoroalkane Sulfonic Acids																				
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005 : 0.001 (Interlab)	0.0113	0.0114	1	0.0057			**0.0057**	**0.0015**	**117**	0.0113			0.0047	0.0048	2	**0.0047**	**0.003**	**44**
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005 : 0.001 (Interlab)	0.0011	0.0011	0	0.0024			**0.0024**	**0.0017**	**34**	0.0011			0.0016	0.0014	13	**0.0016**	**0.001**	**46**
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002 : 0.0001 (Interlab)	0.0017	0.0016	6	0.0013			0.0013	0.0012	8	0.0017			<0.0002	<0.0002	0	<0.0002	0.0002	0
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	<0.001	0

Field Duplicates (Water)
Filter: Lab_Report_Number in('EP2202113','EP2201691')

		Lab Report Number	EP2201691	EP2201691		EP2201691	Interlab_D		EP2201691	EP2201691		EP2201691	Interlab_D		EP2202113	EP2202113		EP2202113	Interlab_D	
		Field ID	MW010	QC01	RPD	MW08	QC02	RPD	MW08	QC06	RPD	MW010	QC07	RPD	MW03	QC1	RPD	MW03	QC2	RPD
		Sampled Date/Time	2/9/2022 15:00	2/9/2022 15:00		2/9/2022 15:00	2/9/2022 15:00		2/9/2022 15:00	2/9/2022 15:00		2/9/2022 15:00	2/9/2022 15:00		2/21/2022 15:00	2/21/2022 15:00		2/21/2022 15:00	2/21/2022 15:00	
Perfluoroalkane Carboxylic Acids																				
Perfluorobutanoic acid (PFBA)	µg/L	0.002 : 0.005 (Interlab)	0.0752	0.0782	4	0.0383			**0.0383**	**0.0196**	**65**	0.0752			0.299	0.278	7	**0.299**	**0.17**	**55**
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005 : 0.001 (Interlab)	0.14	0.142	1	0.0603			**0.0603**	**0.0411**	**38**	0.14			0.562	0.601	7	**0.562**	**0.37**	**41**
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005 : 0.001 (Interlab)	0.122	0.112	9	0.0349			**0.0349**	**0.017**	**69**	0.122			0.289	0.318	10	**0.289**	**0.2**	**36**
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005 : 0.001 (Interlab)	0.137	0.138	1	0.0239			**0.0239**	**0.0071**	**108**	0.137			0.104	0.103	1	**0.104**	**0.05**	**70**
Perfluorooctanoic acid (PFOA)	µg/L	0.0005 : 0.001 (Interlab)	0.0734	0.0712	3	0.0048			**0.0048**	**0.0017**	**95**	0.0734			0.0109	0.0129	17	**0.0109**	**0.008**	**31**
Perfluorononanoic acid (PFNA)	µg/L	0.0005 : 0.001 (Interlab)	0.0226	0.021	7	0.0015			**0.0015**	**<0.0005**	**100**	0.0226			0.0006	0.0006	0	0.0006	<0.001	0
Perfluorodecanoic acid (PFDA)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			**<0.0005**	**0.0009**	**57**	<0.0005			<0.0005	<0.0005	0	<0.0005	<0.001	0
(n:2) Fluorotelomer Sulfonic Acids																				
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001	<0.001	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001	<0.005	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001	<0.001	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001	<0.001	0
Perfluoroalkyl Sulfonamides																				
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001	<0.005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001	<0.005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	<0.005	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001	<0.005	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001	<0.005	0
PFAS																				
Sum of PFAS (WA DER List)_	µg/L	0.0002 : 0.005 (Interlab)	0.562	0.556	1	0.172			**0.172**	**0.0909**	**62**	0.562			1.27	1.32	4	**1.27**	**0.8422**	**41**
Sum of PFHxS and PFOS	µg/L	0.0002 : 0.001 (Interlab)	0.0028	0.0027	4	0.0037			0.0037	0.0029	24	0.0028			0.0016	0.0014	13	0.0016	0.0012	29
Sum of PFAS	µg/L	0.0002 : 0.005 (Interlab)	0.584	0.576	1	0.173			**0.173**	**0.0918**	**61**	0.584			1.27	1.32	4	**1.27**	**0.8432**	**40**
BTEX																				
Benzene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Toluene	µg/L	2 : 1 (Interlab)	<2	<2	0	<2	<1	0	<2	<2	0	<2	<1	0	<2	<2	0	<2	<1	0
Ethylbenzene	µg/L	2 : 1 (Interlab)	<2	<2	0	<2	<1	0	<2	<2	0	<2	<1	0	<2	<2	0	<2	<1	0
Xylene (m & p)	µg/L	2	<2	<2	0	<2	<2	0	<2	<2	0	<2	<2	0	<2	<2	0	<2	<2	0
Xylene (o)	µg/L	2 : 1 (Interlab)	<2	<2	0	<2	<1	0	<2	<2	0	<2	<1	0	<2	<2	0	<2	<1	0
Xylene Total	µg/L	2 : 3 (Interlab)	<2	<2	0	<2	<3	0	<2	<2	0	<2	<3	0	<2	<2	0	<2	<3	0
Total BTEX	µg/L	1	<1	<1	0	<1			<1	<1	0	<1			<1	<1	0	<1		
Total Recoverable Hydrocarbons																				
C10 - C40 (Sum of total)	mg/l	0.1	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
Polycyclic Aromatic Hydrocarbons																				
Naphthalene	µg/L	5 : 1 (Interlab)	<5	<5	0	<5	<1	0	<5	<5	0	<5	<1	0	<5	<5	0	<5	<1	0
Naphthalene	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Benzo(a)pyrene TEQ calc (Zero)	µg/L	0.5 : 1 (Interlab)	<0.5	<0.5	0	<0.5	<1	0	<0.5	<0.5	0	<0.5	<1	0	<0.5	<0.5	0	<0.5	<1	0
Organochlorine Pesticides																				
Chlordane (cis)	µg/L	0.5													<0.5	<0.5	0	<0.5		
Chlordane (trans)	µg/L	0.5													<0.5	<0.5	0	<0.5		
Organophosphorous Pesticides																				
Azinophos methyl	µg/L	0.5 : 2 (Interlab)													<0.5	<0.5	0	<0.5	<2	0
Bromophos-ethyl	µg/L	0.5													<0.5	<0.5	0	<0.5		
Carbophenothion	µg/L	0.5													<0.5	<0.5	0	<0.5		
Chlorfenvinphos	µg/L	0.5 : 20 (Interlab)													<0.5	<0.5	0	<0.5	<20	0
Chlorpyrifos	µg/L	0.5 : 2 (Interlab)													<0.5	<0.5	0	<0.5	<2	0
Chlorpyrifos-methyl	mg/l	0.0005 : 0.002 (Interlab)													<0.0005	<0.0005	0	<0.0005	<0.002	0
Diazinon	µg/L	0.5 : 2 (Interlab)													<0.5	<0.5	0	<0.5	<2	0
Dichlorvos	µg/L	0.5 : 2 (Interlab)													<0.5	<0.5	0	<0.5	<2	0
Dimethoate	µg/L	0.5 : 2 (Interlab)													<0.5	<0.5	0	<0.5	<2	0
Ethion	µg/L	0.5 : 2 (Interlab)													<0.5	<0.5	0	<0.5	<2	0
Fenthion	µg/L	0.5 : 2 (Interlab)													<0.5	<0.5	0	<0.5	<2	0
Malathion	µg/L	0.5 : 2 (Interlab)													<0.5	<0.5	0	<0.5	<2	0
Methyl parathion	µg/L	2													<2	<2	0	<2	<2	0
Monocrotophos	µg/L	2													<2	<2	0	<2	<2	0
Prothiofos	µg/L	0.5													<0.5	<0.5	0	<0.5		
Other																				
Acidity (as CaCO3)	mg/l	1 : 10 (Interlab)	<1	<1	0	**45**	**<10**	**127**	45	35	25	**<1**	**50**	**192**	27	26	4	27	31	14
Diethanolamine	mg/l	0.001 : 0.5 (Interlab)	<0.01	<0.01	0	<0.01	<1	0	<0.01	<0.01	0	<0.01	<1	0	<0.01	<0.01	0	<0.01	<5	0
Ethanolamine	mg/l	0.001 : 0.5 (Interlab)	<0.01	<0.01	0	<0.01	<1	0	<0.01	<0.01	0	<0.01	<1	0	<0.01	<0.01	0	<0.01	<5	0
Methyldiethanolamine	mg/l	0.001 : 0.05 (Interlab)	<0.01	<0.01	0	<0.01	<0.05	0	<0.01	<0.01	0	<0.01	<0.05	0	<0.01	<0.01	0	<0.01	<0.05	0
PCBs																				
PCBs (Sum of total)	µg/L	1 : 5 (Interlab)													<1	<1	0	<1	<5	0
Pesticides																				
Demeton-S-methyl	µg/L	0.5													<0.5	<0.5	0	<0.5		
Fenamiphos	µg/L	0.5													<0.5	<0.5	0	<0.5		
Parathion	µg/L	2													<2	<2	0	<2	<2	0
Pirimphos-ethyl	µg/L	0.5													<0.5	<0.5	0	<0.5		
TPH																				
F1 (C6-C10) less BTEX	mg/l	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
F2 C10-C16 (minus Naphthalene)	mg/l	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	0.05	0	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0
C6 - C9	mg/l	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
C10 - C14	mg/l	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	**<0.05**	**0.07**	**33**	<0.05	<0.05	0	<0.05	<0.05	0
C15 - C28	mg/l	0.1	<0.1	<0.1	0	<0.1	0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
C29-C36	mg/l	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
+C10 - C36 (Sum of total)	mg/l	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	**<0.05**	**0.1**	**67**	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
F1 (C6-C10)	mg/l	0.02	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
F2 (C10-C16 Hydrocarbons)	mg/l	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	0.05	0	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0
F3 (C16-C34 Hydrocarbons)	mg/l	0.1	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
C34-C40	mg/l	0.1	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0

*RPDs have only been considered where a concentration is greater than 0 times the EQL.
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (0-10 x EQL); 30 (10-30 x EQL); 30 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Field Blanks (Water)
Filter: Lab_Report_Number in('EP2202113','EP2201691')

Lab Report Number			EP2201691	EP2201691	EP2201691	EP2201691	EP2201691	EP2201691	EP2202113	EP2202113	EP2202113
Field ID			QC03	QC04	QC05	QC08	QC09	TBW46	QC3	QC4	TBW166
Sampled_Date/Time			2/9/2022	2/9/2022	2/9/2022 15:00	2/10/2022	2/10/2022	2/10/2022 15:00	2/21/2022	2/21/2022	2/21/2022 15:00
Sample Type			Field_B	Rinsate	Rinsate	Field_B	Rinsate	Trip_B	Field_B	Rinsate	Trip_B
ChemName	**Units**	**EQL**									
Alkalinity											
Alkalinity (total as CaCO3)	mg/l	1									
Alkalinity (Hydroxide) as CaCO3	mg/l	1									
Carbonate Alkalinity as CaCO3	mg/l	1									
BTEX											
Benzene	µg/l	1	<1		<1	<1	<1		<1	<1	<1
Toluene	µg/L	2	<2		<2	<2	<2		<2	<2	<2
Ethylbenzene	µg/L	2	<2		<2	<2	<2		<2	<2	<2
Xylene (m & p)	µg/L	2	<2		<2	<2	<2		<2	<2	<2
Xylene (o)	µg/L	2	<2		<2	<2	<2		<2	<2	<2
Xylene Total	µg/L	2	<2		<2	<2	<2		<2	<2	<2
Total BTEX	µg/L	1	<1		<1	<1	<1		<1	<1	<1
Inorganics											
Alkalinity (Bicarbonate as CaCO3)	mg/l	1									
Total Phosphorus as P (Organic Phosphate as P)	mg/l	0.01									
Ions											
Calcium (Filtered)	mg/l	1									
Chloride	mg/l	1									
Potassium (Filtered)	mg/l	1									
Sodium (Filtered)	mg/l	1									
Ionic Balance	%	0.01									
Anions Total	meq/L	0.01									
Cations Total	meq/L	0.01									
Metals											
Magnesium (Filtered)	mg/l	1									
Arsenic	mg/l	0.001								<0.001	
Arsenic (Filtered)	mg/l	0.001									
Cadmium	mg/l	0.0001								<0.0001	
Cadmium (Filtered)	mg/l	0.0001									
Chromium (III+VI)	mg/l	0.001								<0.001	
Chromium (III+VI) (Filtered)	mg/l	0.001									
Copper	mg/l	0.001								<0.001	
Copper (Filtered)	mg/l	0.001									
Lead	mg/l	0.001								<0.001	
Lead (Filtered)	mg/l	0.001									
Mercury	mg/l	0.0001								<0.0001	
Mercury (Filtered)	mg/l	0.00004									
Nickel	mg/l	0.001								<0.001	
Nickel (Filtered)	mg/l	0.001									
Zinc	mg/l	0.005								<0.005	
Zinc (Filtered)	mg/l	0.005									
Aluminium (Filtered)	mg/l	0.01									
Iron (Filtered)	mg/l	0.05									
Manganese (Filtered)	mg/l	0.001									
Nutrients											
Ammonia as N	mg/l	0.01									
Nitrite + Nitrate as N	mg/l	0.01									
Nitrate (as NO3-N)	mg/l	0.01									
Nitrite (as NO2-N)	mg/l	0.01									
Nitrogen (Total)	mg/l	0.1									
Total Kjeldahl Nitrogen (TKN)	mg/l	0.1									
OCP											
4,4-DDE	µg/L	0.5			<0.5		<0.5			<0.5	
a-BHC	µg/L	0.5			<0.5		<0.5			<0.5	
Aldrin	µg/L	0.5			<0.5		<0.5			<0.5	
Aldrin + Dieldrin	µg/L	0.5			<0.5		<0.5			<0.5	
b-BHC	µg/L	0.5			<0.5		<0.5			<0.5	
chlordane	µg/L	0.5			<0.5		<0.5			<0.5	
d-BHC	µg/L	0.5			<0.5		<0.5			<0.5	
DDD	µg/L	0.5			<0.5		<0.5			<0.5	
DDT	µg/L	2			<2		<2			<2	
Dieldrin	µg/L	0.5			<0.5		<0.5			<0.5	
Endosulfan I	µg/L	0.5			<0.5		<0.5			<0.5	
Endosulfan II	µg/L	0.5			<0.5		<0.5			<0.5	
Endosulfan sulphate	µg/L	0.5			<0.5		<0.5			<0.5	
Endrin	µg/L	0.5			<0.5		<0.5			<0.5	
Endrin aldehyde	µg/L	0.5			<0.5		<0.5			<0.5	
Endrin ketone	µg/L	0.5			<0.5		<0.5			<0.5	
g-BHC (Lindane)	µg/L	0.5			<0.5		<0.5			<0.5	
Heptachlor	µg/L	0.5			<0.5		<0.5			<0.5	
DDT+DDE+DDD	µg/L	0.5			<0.5		<0.5			<0.5	
Heptachlor epoxide	µg/L	0.5			<0.5		<0.5			<0.5	
Hexachlorobenzene	µg/L	0.5			<0.5		<0.5			<0.5	
Methoxychlor	µg/L	2			<2		<2			<2	
Organochlorine Pesticides											
Chlordane (cis)	µg/L	0.5			<0.5		<0.5			<0.5	
Chlordane (trans)	µg/L	0.5			<0.5		<0.5			<0.5	
Organophosphorous Pesticides											
Azinophos methyl	µg/L	0.5			<0.5		<0.5			<0.5	
Bromophos-ethyl	µg/L	0.5			<0.5		<0.5			<0.5	
Carbophenothion	µg/L	0.5			<0.5		<0.5			<0.5	
Chlorfenvinphos	µg/L	0.5			<0.5		<0.5			<0.5	
Chlorpyrifos	µg/L	0.5			<0.5		<0.5			<0.5	
Chlorpyrifos-methyl	mg/l	0.0005			<0.0005		<0.0005			<0.0005	
Diazinon	µg/L	0.5			<0.5		<0.5			<0.5	
Dichlorvos	µg/L	0.5			<0.5		<0.5			<0.5	
Dimethoate	µg/L	0.5			<0.5		<0.5			<0.5	
Ethion	µg/L	0.5			<0.5		<0.5			<0.5	
Fenthion	µg/L	0.5			<0.5		<0.5			<0.5	
Malathion	µg/L	0.5			<0.5		<0.5			<0.5	
Methyl parathion	µg/L	2			<2		<2			<2	
Monocrotophos	µg/L	2			<2		<2			<2	
Prothiofos	µg/L	0.5			<0.5		<0.5			<0.5	
Other											
Acidity (as CaCO3)	mg/l	1									
Diethanolamine	mg/l	0.001			<0.01		<0.01			<0.01	
Ethanolamine	mg/l	0.001			<0.01		<0.01			<0.01	
Methyldiethanolamine	mg/l	0.001			<0.01		<0.01			<0.01	
PAH											
Acenaphthene	µg/L	1	<1		<1	<1	<1			<1	
Acenaphthylene	µg/L	1	<1		<1	<1	<1			<1	
Anthracene	µg/L	1	<1		<1	<1	<1			<1	
Benz(a)anthracene	µg/L	1	<1		<1	<1	<1			<1	
Benzo(a) pyrene	µg/L	0.5	<0.5		<0.5	<0.5	<0.5			<0.5	
Benzo(g,h,i)perylene	µg/L	1	<1		<1	<1	<1			<1	
Benzo(k)fluoranthene	µg/L	1	<1		<1	<1	<1			<1	
Chrysene	µg/L	1	<1		<1	<1	<1			<1	
Benzo(b+j)fluoranthene	µg/L	1	<1		<1	<1	<1			<1	
Dibenz(a,h)anthracene	µg/L	1	<1		<1	<1	<1			<1	
Fluoranthene	µg/L	1	<1		<1	<1	<1			<1	
Fluorene	µg/L	1	<1		<1	<1	<1			<1	
Indeno(1,2,3-c,d)pyrene	µg/L	1	<1		<1	<1	<1			<1	
Phenanthrene	µg/L	1	<1		<1	<1	<1			<1	
Pyrene	µg/L	1	<1		<1	<1	<1			<1	
PAHs (Sum of total)	µg/L	0.5	<0.5		<0.5	<0.5	<0.5			<0.5	
PCBs											
PCBs (Sum of total)	µg/L	1			<1		<1			<1	

Field Blanks (Water)
Filter: Lab_Report_Number in('EP2202113','EP2201691')

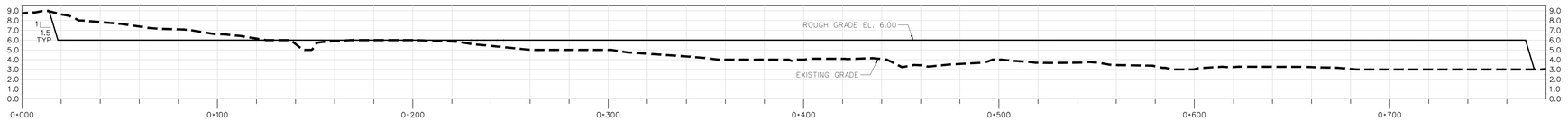
		Lab Report Number	EP2201691	EP2201691	EP2201691	EP2201691	EP2201691	EP2201691	EP2202113	EP2202113	EP2202113
		Field ID	QC03	QC04	QC05	QC08	QC09	TBW46	QC3	QC4	TBW166
		Sampled_Date/Time	2/9/2022	2/9/2022	2/9/2022 15:00	2/10/2022	2/10/2022	2/10/2022 15:00	2/21/2022	2/21/2022	2/21/2022 15:00
		Sample Type	Field_B	Rinsate	Rinsate	Field_B	Rinsate	Trip_B	Field_B	Rinsate	Trip_B
Perfluoroalkane Carboxylic Acids											
Perfluorobutanoic acid (PFBA)	µg/L	0.002		<0.002	<0.002		<0.002	<0.002		<0.1	
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005		<0.0005	<0.0005		<0.0005	<0.0005		<0.02	
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005		<0.0005	<0.0005		<0.0005	<0.0005		<0.02	
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005		<0.0005	<0.0005		<0.0005	<0.0005		<0.02	
Perfluorooctanoic acid (PFOA)	µg/L	0.0005		<0.0005	<0.0005		<0.0005	<0.0005		<0.01	
Perfluorononanoic acid (PFNA)	µg/L	0.0005		<0.0005	<0.0005		<0.0005	<0.0005		<0.02	
Perfluorodecanoic acid (PFDA)	µg/L	0.0005		<0.0005	<0.0005		<0.0005	<0.0005		<0.02	
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005		<0.0005	<0.0005		<0.0005	<0.0005		<0.02	
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005		<0.0005	<0.0005		<0.0005	<0.0005		<0.02	
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005		<0.0005	<0.0005		<0.0005	<0.0005		<0.02	
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005		<0.0005	<0.0005		<0.0005	<0.0005		<0.05	
Perfluoroalkane Sulfonic Acids											
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005		<0.0005	<0.0005		<0.0005	<0.0005		<0.02	
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005		<0.0005	<0.0005		<0.0005	<0.0005		<0.02	
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005		<0.0005	<0.0005		<0.0005	<0.0005		<0.01	
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005		<0.0005	<0.0005		<0.0005	<0.0005		<0.02	
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002		<0.0002	<0.0002		<0.0002	<0.0002		<0.01	
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005		<0.0005	<0.0005		<0.0005	<0.0005		<0.02	
(n:2) Fluorotelomer Sulfonic Acids											
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001		<0.001	<0.001		<0.001	<0.001		<0.05	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001		<0.001	<0.001		<0.001	<0.001		<0.05	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001		<0.001	<0.001		<0.001	<0.001		<0.05	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001		<0.001	<0.001		<0.001	<0.001		<0.05	
Pesticides											
Demeton-S-methyl	µg/L	0.5			<0.5		<0.5			<0.5	
Fenamiphos	µg/L	0.5			<0.5		<0.5			<0.5	
Parathion	µg/L	2			<2		<2			<2	
Pirimphos-ethyl	µg/L	0.5			<0.5		<0.5			<0.5	
PFAS											
Sum of PFAS (WA DER List)	µg/L	0.0002		<0.0002	<0.0002		<0.0002	<0.0002		<0.01	
Sum of PFHxS and PFOS	µg/L	0.0002		<0.0002	<0.0002		<0.0002	<0.0002		<0.01	
Sum of PFAS	µg/L	0.0002		<0.0002	<0.0002		<0.0002	<0.0002		<0.01	
Physical Parameters											
Electrical Conductivity @ 25C (lab)	µS/cm	1									
Total Dissolved Solids (TDS)	mg/l	10									
pH (lab)	pH_unit	0.01									
Polycyclic Aromatic Hydrocarbons											
Naphthalene	µg/L	1	<5		<5	<5	<5		<5	<5	<5
Benzo(a)pyrene TEQ calc (Zero)	µg/L	0.5	<0.5		<0.5	<0.5	<0.5			<0.5	
Total Recoverable Hydrocarbons											
C10 - C40 (Sum of total)	mg/l	0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	
TPH											
F1 (C6-C10) less BTEX	mg/l	0.02	<0.02		<0.02	<0.02	<0.02		<0.02	<0.02	<0.02
F2 C10-C16 (minus Naphthalene)	mg/l	0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	
C6 - C9	mg/l	0.02	<0.02		<0.02	<0.02	<0.02		<0.02	<0.02	<0.02
C10 - C14	mg/l	0.05	<0.05		<0.05	<0.05	<0.05		<0.05	<0.05	
C15 - C28	mg/l	0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	
C29-C36	mg/l	0.05	<0.05		<0.05	<0.05	<0.05		<0.05	<0.05	
+C10 - C36 (Sum of total)	mg/l	0.05	<0.05		<0.05	<0.05	<0.05		<0.05	<0.05	
F1 (C6-C10)	mg/l	0.02	<0.02		<0.02	<0.02	<0.02		<0.02	<0.02	<0.02
F2 (C10-C16 Hydrocarbons)	mg/l	0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	
F3 (C16-C34 Hydrocarbons)	mg/l	0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	
C34-C40	mg/l	0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	

APPENDIX D: FIGURES

DRAFT

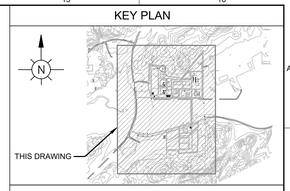
APPENDIX E: DEVELOPMENT PLANS

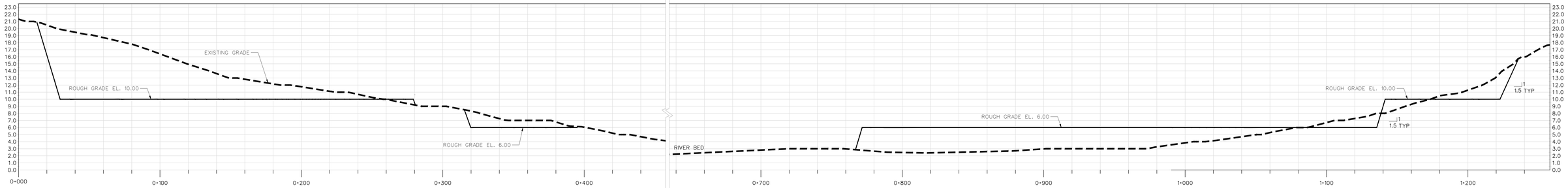
DRAFT



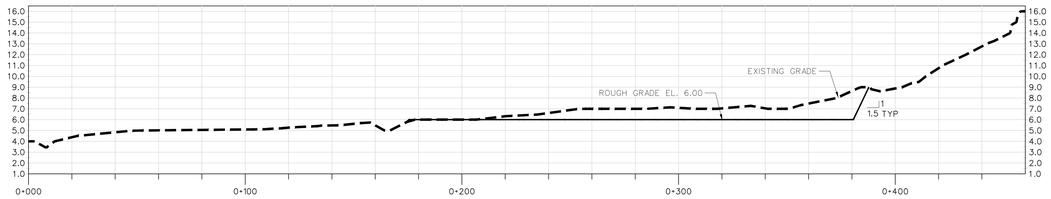
SECTION A-A (140436-0000-41DK-0003)
SCALE H 1:1000
V 1:200

KEY PLAN





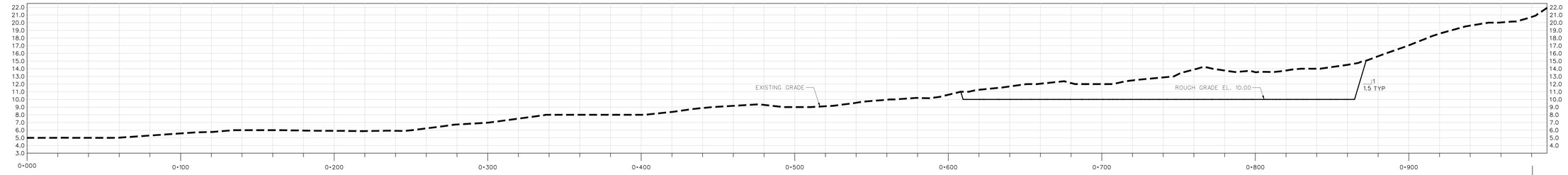
SECTION B-B (140436-0000-41DK-0003)
SCALE H 1:1000
V 1:200



SECTION D-D (140436-0000-41DK-0003)
SCALE H 1:1000
V 1:200

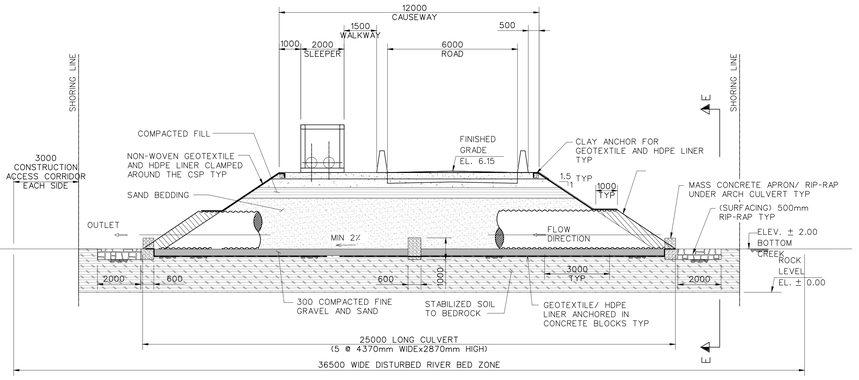
NOTES

1. PLANT COORDINATES N= 1,000 AND E= 1,000 WILL BE ESTABLISHED AT THE DATUM POINT FOR SITE "F", AND WILL BE EQUIVALENT TO N= 7,718,236 AND E= 475,951 BASED ON DATUM GDA 94, MGA ZONE 50.
2. REFERENCE PLANT ELEVATION 100,000 HPP (HIGH POINT PAVING) EQUALS 6.500 MASL (METERS ABOVE SEA LEVEL) ON SITES C AND F.
3. COORDINATES AND ELEVATIONS ARE EXPRESSED IN METERS; DIMENSIONS ARE EXPRESSED IN MILLIMETERS.
4. EXCAVATED MATERIAL SHALL BE HAULED TO DESIGNATED LOCATION WITHIN 5 km OF THE SITE ONE WAY.
5. CSP SHALL BE COATED WITH ANTI RUST LAYER.

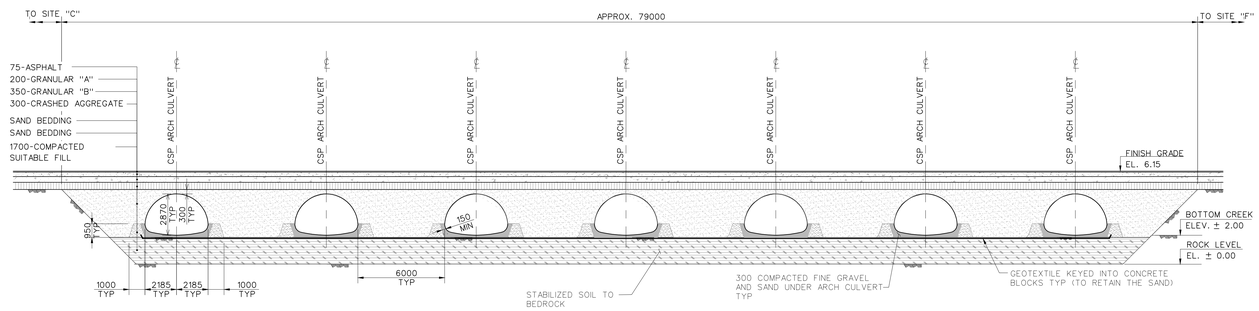


SECTION E-E (140436-0000-41DK-0003)
SCALE H 1:1000
V 1:200

LEGEND



SECTION C-C (140436-0000-41DK-0003)
SCALE 1:100



ELEVATION F-F
CSP ARCH CULVERTS
1:150

ABBREVIATIONS

FOR INFORMATION-
NOT TO BE USED FOR
CONSTRUCTION

DOCUMENT NUMBER	REFERENCE DOCUMENTS	DOCUMENT NUMBER	REFERENCE DOCUMENTS

REV	DATE	REVISION DESCRIPTION	DRN	CHK	APVD
00	19-06-20	ISSUED FOR INFORMATION	GT	WW	FR

REV	DATE	REVISION DESCRIPTION	DRN	CHK	APVD

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PERDAMAN INDUSTRIES
Perdaman Chemicals and Fertilisers
(Perth, Australia)

DESIGNED	G. TODOROVA	2019-06-20
DRAWN	G. TODOROVA	2019-06-20
CHECKED	W. WOOLNOUGH	2019-06-20
APPROVED	F. RASCHELLA	2019-06-20
SCALE	AS SHOWN	

PERDAMAN PROJECT DESTINY
2.05 MTPA GRANULAR UREA PLANT
OVERALL SITEPLAN
SECTIONS

DRAWING NUMBER 140436-0000-41DK-0004
REV 00

TODOG p:\60689\cov\00001\140436-0000-41dk-0004.dwg, June 20, 2019 9:01:08 PM

METRIC FORMAT "140436-A0-DD.DWG"

APPENDIX F: GROUNDWATER SAMPLING FIELD SHEETS

DRAFT

TETRA TECH COFFEY

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME:	Perdaman OSI	**PROJECT NUMBER:**	754-PEREN29575
FIELD PERSONNEL:	S.A.	**DATE:**	21/2/22
PROJECT MANAGER:	B.W.	**PAGE**	1 of 1

WELL ID: MW03 **DIAMETER:** 50 mm **WELL DEPTH:** 2.965 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 50 cm ~~mm~~

FIELD EQUIPMENT IDENTITIES

IP Serial number: 02-0568

WQM Serial Number: _____

PID Serial number: _____

FIELD EQUIPMENT INSTALLATION DETAILS

Depth to Water - Before Pump Installation: ~~2.96~~ 0.543 m below TOC

After Pump Installation: 0.543 m below TOC

Pump Intake Depth: _____

Equipment Volume: _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN ~~(mg/l)~~ %		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
12:31	350		0.543	15.2		124699		7.48		49.6		32.3		✓					low turbidity, clear
12:33	350		0.541	11.4		124253		7.41		47.7		32.4		✓					"
12:35	350		0.543	9.2		124034		7.38		46.4		32.5		✓					"
12:37	350		0.543	9.1		124004		7.37		45.9		32.5		✓					"
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☒ N ☐ DUPLICATE ID: QC1

TRIPLICATE COLLECTED: Y ☒ N ☐ TRIPLICATE ID: QC2

WERE METALS FIELD FILTERED? Y ☐ N ☒ NA ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☒ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

TETRA TECH COFFEY

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME:	Perdaman DSI	**PROJECT NUMBER:**	754-PERENV29575
FIELD PERSONNEL:	S.A.	**DATE:**	21/2/22
PROJECT MANAGER:	B.W.	**PAGE**	1 of 1

WELL ID: MW02. **DIAMETER:** 50 mm **WELL DEPTH:** 3.271 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 50 cm ~~mm~~

FIELD EQUIPMENT IDENTITIES

IP Serial number: #02-0568

WQM Serial Number: _____

PID Serial number: _____

FIELD EQUIPMENT INSTALLATION DETAILS

Depth to Water - Before Pump Installation: 0.758 m below TOC

After Pump Installation: 0.760 m below TOC

Pump Intake Depth: _____

Equipment Volume: _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN ~~(mg/L)~~ %		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
1:37	350			32.1		175213		6.97		56.8		31.5		X					low turbidity, no odour
1:39	"			27.1		174186		6.97		56.4		31.5		X					"
1:41	"			29.1		174878		6.97		56.0		31.5		X					"
1:43	"			29.2		174898		6.97		56.0		31.5		X					"
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☒ DUPLICATE ID: _____ **TRIPLICATE COLLECTED:** Y ☐ N ☒ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☐ N ☒ NA ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☒ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

TETRA TECH COFFEY

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME:	Perdaman D.S.I.	**PROJECT NUMBER:**	754-PERGN295751
FIELD PERSONNEL:	S.A.	**DATE:**	21/2/22
PROJECT MANAGER:	B.W.	**PAGE**	1 of 1

WELL ID: BH27 **DIAMETER:** 50 mm **WELL DEPTH:** 10.845 m **SCREEN INTERVAL:** – to – m below TOC **STICK-UP:** 0.5 m

FIELD EQUIPMENT IDENTITIES

IP Serial number: 02-0568

WQM Serial Number:

PID Serial number:

FIELD EQUIPMENT INSTALLATION DETAILS Bailer Used

Depth to Water - Before Pump Installation: 0.631 m below TOC

After Pump Installation: 0.631 m below TOC

Pump Intake Depth:

Equipment Volume:

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM:

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (~~mg/L~~ %) READING	DISSOLVED OXYGEN CHANGE*	ELECTRICAL CONDUCTIVITY (mS or µS/cm) READING	ELECTRICAL CONDUCTIVITY CHANGE*	pH (pH units) READING	pH CHANGE*	REDOX POTENTIAL (mV) READING	REDOX POTENTIAL CHANGE*	TEMPERATURE (°C) READING	TEMPERATURE CHANGE	CLARITY – tick one: Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	COMMENTS ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
2:32	Bailer used x30 times purged.			11.6		189949		6.62		53.1		29.8							cloudy, high turbidity, well bailed 30 times.
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☒ DUPLICATE ID:

TRIPLICATE COLLECTED: Y ☐ N ☒ TRIPLICATE ID:

WERE METALS FIELD FILTERED? Y ☐ N ☒ NA ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☒ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office: Tetra Tech Coffey
Report Results to: Bernie Weekes
Invoices to: accounts.perth@tetratech.com

Mobile: 0407817762
Phone:

Email: bernie.weekes@coffey.com @tetratech.com
Email: @tetratech.com

Project No: 754-PERGV295751
Task No:
Project Name: Perdaman PS 1
Laboratory: ALS
Sampler's Name: Sanjana Audit
Project Manager: Bernie Weekes
Quote number (if different to current quoted prices):
Special Instructions:

Analysis Request Section

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	Interlab triplicate, please send to REL											NOTES
	MW03	21/2/22	AM	water	various	3 days												Analysis to be emailed by Bernie Weekes
	MW02	"	"	"	↓	"												
	BH27	"	"	"		"												
	QC1	"	"	"		"												
	QC2	"	"	"		"	✓											
	QC3	"	"	"		"												
	QC4	"	"	"		"												
	TBW166	"	"	"	1 vial	"												
	MW09	"	"	"	various	"												

RELINQUISHED BY		RECEIVED BY	
Name: Sanjana Audit	Date: 21/2/22 →	Name:	Date:
Coffey	Time:	Company:	Time:
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)
- All Samples Recieved in Good Condition ☐
- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

*Container Type & Preservation Codes: **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

TETRA TECH COFFEY

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME:	Perdaman DSI	**PROJECT NUMBER:**	754-PEREN29575P
FIELD PERSONNEL:	S.A.	**DATE:**	21/2/22
PROJECT MANAGER:	B.W.	**PAGE**	1 of 1

WELL ID: MW09 **DIAMETER:** 50 mm **WELL DEPTH:** _____ m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** _____ mm

FIELD EQUIPMENT IDENTITIES

IP Serial number: 02-0568

WQM Serial Number: _____

PID Serial number: _____

FIELD EQUIPMENT INSTALLATION DETAILS Bailer used.

Depth to Water - Before Pump Installation: 0.593 m below TOC

After Pump Installation: 0.591 m below TOC

Pump Intake Depth: _____

Equipment Volume: _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN ~~(mg/l)~~ %		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
14:00	Bailer used X10 times purged.			17.9		141300		7.09		39.4		29.8					X		cloudy, ~~high~~ moderately turbid.
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☒ DUPLICATE ID: _____ **TRIPLICATE COLLECTED:** Y ☐ N ☒ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☐ N ☒ NA ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☒ N ☐

Notes: 1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

TETRA TECH COFFEY

Well Gauging Form

PROJECT NAME:	Perdaman DSI	**PROJECT NUMBER:**	754- PEREN 295751
FIELD PERSONNEL:	S.A.	**DATE:**	21/02/22
PROJECT MANAGER:	B.W.	**PAGE:**	1 of 1

FIELD EQUIPMENT:

Equipment Used: IP - HOIL / SMOIL IP Serial Number: #02-0568

Time of Day	Well ID	Well Diameter	Total Well Depth **note 1**	Depth to PSH (NAPL) [A]	Depth to Groundwater [B]	PSH Thickness [B-A]	Height of Well Stick-Up	COMMENTS (**notes 2 & 3**) ODOUR, COLOUR, SHEEN, NAPL (and its colour), REMEDIATION SYSTEM, etc
		mm	m	mBTOC	mBTOC	mm	m	
11:33	BH27	50	10.845	N/A	0.631	N/A	0.5	cloudy, high turbidity, no odour.
11:43	MW02	11	3.271	N/A	0.758	N/A	0.5	clear, colourless, no odour.
11:52	MW03	11	2.965	N/A	0.543	N/A	0.5	clear colourless, no odour.
16:00 *low tide	MW09	11	3.88	N/A	0.621	N/A	0.50	~~slightly~~ moderately cloudy, no odour.

Notes: 1 Indicate in 'Comments' column if measured Total Well Depth differs from log. 2 Do not attempt to sniff the monitoring well to detect any odours, only note any apparent odour when the well cap is opened.
3 If no site map / field sketch or detailed survey information is available for each well, please provide a description of the well location and or hand held GPS co-ordinates to positively identify the well.

ECO Environmental

Environmental Monitoring & Sampling Equipment Rentals and sales.

Tel: +61 8 9328 2900
fax: +61 8 9328 2677
eco@ecoenvironmental.com.au
www.ecoenvironmental.com.au

EQUIPMENT INFORMATION

Instrument: YSIPP2

Serial Number: 19K102538 (Display)

Lot Number: 20B140267 (Sonde)

EQUIPMENT CHECK	Enclosed	Returned	Comment
YSI Pro Plus Display	✓		
YSI Quatro Sonde	✓		
Flow Cell	✓		
Probe Guard	✓		
Rubber Storage/Calibration Sleeve	✓		
Calibration Cup + Cap	✓		
YSI Pro Series ProComm II Kit	✓		
USB Software, Instruction Manual & Field Sheets	✓		
Spare Batteries (x 2)	✓		

SENSOR CALIBRATION DETAILS

		Calibration Undertaken	Accuracy	Pass	Fail
Temperature		Factory Calibrated	±0.2°C	✓	
Dissolved Oxygen	✓	100% Saturation	±2%	✓	
		Pressure Compensation	1011 hPa	✓	
Conductivity	✓	1288mS/cm	±0.5%	✓	
	✓	Check linearity at 1.4mS/cm	±0.5%	✓	
Salinity		Auto Calibrated	±1%	✓	
pH	✓	pH 7.00	± 0.2	✓	
	✓	pH 4.00	± 0.2	✓	
ORP	✓	233 mV at 23 °C	±20mV	✓	

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Tia Cochrane

ECO Environmental Equipment Specialist

Date: 18.01.2022

ECO Environmental

Environmental monitoring
& sampling equipment
Rentals and sales.

Tel: +61 8 9328 2900
fax: +61 8 9328 2677
eco@ecoenvironmental.com.au
www.ecoenvironmental.com.au

EQUIPMENT INFORMATION

Instrument: GPP8 - Geotech Peristaltic Pump

Serial Number: C14000861

Equipment Check

	Enclosed	Returned	Comment
GeoPump Controller	✓		
Power Supply Cable	✓		
Car Battery Adapter	✓		
Carry Bag	✓		
12v portable battery	✓		
Battery charger	✓		

Inspection Details	Pass	Fail	Comment
De-con wash of unit & cable	✓		
De-con wash of battery & carry case	✓		
Inspection for faults, corrosion and damage	✓		
Unit in good working order, clean & ready for use	✓		

This is to certify that where possible this instrument has been cleaned in accordance with the manufacture's general maintenance procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

N.Bhat

Equipment Specialist
ECO Environmental

Date: 22.12.2021

TETRA TECH COFFEY

Job/site details:			
Project name:	PERRAMAN	Project Number:	
Fieldwork date(s):	10/2/22	Work completed by:	NT/CR.
Type of work (ESA, GME etc)	GME.		

Photoionisation Detector (PID)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Challenge gas standard:		Gas batch #:		Gas expiry date:	

Field challenge details:

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

Lower explosive level (LEL) meter (or multi gas meter)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Challenge gas standard:		Gas batch #:		Gas expiry date:	
Field challenge details:		If recorded on hot work permit, record HWP number here:			

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

Water quality meter (WQM)					
Equipment description:	YSI WQ METER.		Equipment serial number:		YSI PPZ
Recommended calibration frequency:	DAILY	Last calibration date:	9/2/22	Calibrated by:	NT.
Calibration standards:	pH 4 & 7	Batch #:	375757/ 378281	Gas expiry date:	—

Field calibration record:

Date calibrated	DO	Conductivity	pH 4.0	pH ~~6.88~~ 7.	Temperature
10/2/22	—	BUMP TEST → 14.19mS/cm.	4.10	7.14	20.7°C.

Interface probe (IP)					
Equipment description:			Equipment serial number:		
Recommended service frequency:		Last service date:		Serviced by:	

Field challenge details:

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

DAILY FIELD SUMMARY WITH CALIBRATION RECORD

TETRA TECH COFFEY

Project name:	PERDAMAN	Project Number:	754_PERGN29575)		
Field personnel:	NICK TAYLOR	Date:	22/1/22		
Project manager:	BERNIE WEEKES	Page:	1	of	1

Time	Description of Tasks Undertaken: Include details onsite, all personnel, standby, phone calls)
8:30	LEAVE ACCOM. FOR TOLL IPEC.
9:00	@ TOLL IPEC TO PICK UP DELIVERIES.
10:30	MEET SURVEYOR
11:00	@ MITRE 10 FOR SUPPLIES
11:30	@ MAC — MEETING RANGER
12:00	START SURVEYING
16:30	END OF DAY.

Job/site details:			
Project name:		Project Number:	
Fieldwork date(s):		Work completed by:	
Type of work (ESA, GME etc)			

Photoionisation Detector (PID)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Challenge gas standard:		Gas batch #:		Gas expiry date:	
Field challenge details:					

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

Lower explosive level (LEL) meter (or multi gas meter)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Challenge gas standard:		Gas batch #:		Gas expiry date:	
Field challenge details:		If recorded on hot work permit, record HWP number here:			

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

Water quality meter (WQM)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Calibration standards:		Batch #:		Gas expiry date:	
Field calibration record:					

Date calibrated	DO	Conductivity	pH 4.0	pH 6.88	Temperature

Interface probe (IP)					
Equipment description:			Equipment serial number:		
Recommended service frequency:		Last service date:		Serviced by:	
Field challenge details:					

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

DAILY FIELD SUMMARY WITH CALIBRATION RECORD

TETRA TECH COFFEY

Project name:	PERDAMAN	Project Number:	754_PEREN295751		
Field personnel:	NICK TAYLOR	Date:	23/1/22		
Project manager:	BERNIE WEEKES	Page:	1	of	1

Time	Description of Tasks Undertaken: Include details onsite, all personnel, standby, phone calls)
7:30	PRE-START
8:00	BEGIN SERVICE CLEARANCES
15:00	SPOTTED UNIDENTIFIED SERVICE ON SITE F NEAR
	ASS2. CALLED SURVEYOR BACK AND FULLY
	IDENTIFIED SERVICE — NOT ON DBYD'S — TELSTRA.
16:30	END OF DAY.

Job/site details:			
Project name:		Project Number:	
Fieldwork date(s):		Work completed by:	
Type of work (ESA, GME etc)			

Photoionisation Detector (PID)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Challenge gas standard:		Gas batch #:		Gas expiry date:	

Field challenge details:

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

Lower explosive level (LEL) meter (or multi gas meter)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Challenge gas standard:		Gas batch #:		Gas expiry date:	
Field challenge details:		If recorded on hot work permit, record HWP number here:			

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

Water quality meter (WQM)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Calibration standards:		Batch #:		Gas expiry date:	

Field calibration record:

Date calibrated	DO	Conductivity	pH 4.0	pH 6.88	Temperature

Interface probe (IP)					
Equipment description:			Equipment serial number:		
Recommended service frequency:		Last service date:		Serviced by:	

Field challenge details:

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

DAILY FIELD SUMMARY WITH CALIBRATION RECORD

TETRA TECH COFFEY

Project name:	Perdaman	Project Number:	754-PEREN
Field personnel:	CR + NT	Date:	24/1/21
Project manager:	BW	Page:	1 of 1

Time	Description of Tasks Undertaken: Include details onsite, all personnel, standby, phone calls)
0545	Leave accomm
0600	Meet drillers, site induction, HSSE
0715	Show drillers around site
0800	Cultural Induction at MAC
0900	Start fieldworks
1230	Stop fieldworks - issue with gas pressure on drill rig, finish fieldworks for day
1250	QA/QC samples
1315	Return to accomm
1345	Pickup eskies from toll
1600	Arrive at accomm - EOD

Job/site details:			
Project name:		Project Number:	
Fieldwork date(s):		Work completed by:	
Type of work (ESA, GME etc)			

Photoionisation Detector (PID)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Challenge gas standard:		Gas batch #:		Gas expiry date:	

Field challenge details:

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

Lower explosive level (LEL) meter (or multi gas meter)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Challenge gas standard:		Gas batch #:		Gas expiry date:	
Field challenge details:		If recorded on hot work permit, record HWP number here:			

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

Water quality meter (WQM)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Calibration standards:		Batch #:		Gas expiry date:	

Field calibration record:

Date calibrated	DO	Conductivity	pH 4.0	pH 6.88	Temperature

Interface probe (IP)					
Equipment description:			Equipment serial number:		
Recommended service frequency:		Last service date:		Serviced by:	

Field challenge details:

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

DAILY FIELD SUMMARY WITH CALIBRATION RECORD

TETRA TECH COFFEY

Project name:	Perdaman	Project Number:	754-PERPN		
Field personnel:	CR + NT	Date:	25/1/22		
Project manager:	BW	Page:	1	of	1

Time	Description of Tasks Undertaken: Include details onsite, all personnel, standby, phone calls)
0550	Depart accomm for site
0625	Arrive on site - prestart
0645	Start fieldworks
1100	Pause fieldworks - drive to toll to dropoff esKies
1230	Resume fieldworks
1400	Stop fieldworks for the day - QA/QC
1445	Leave site for accomm

Job/site details:			
Project name:		Project Number:	
Fieldwork date(s):		Work completed by:	
Type of work (ESA, GME etc)			

Photoionisation Detector (PID)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Challenge gas standard:		Gas batch #:		Gas expiry date:	

Field challenge details:

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

Lower explosive level (LEL) meter (or multi gas meter)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Challenge gas standard:		Gas batch #:		Gas expiry date:	
Field challenge details:		If recorded on hot work permit, record HWP number here:			

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

Water quality meter (WQM)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Calibration standards:		Batch #:		Gas expiry date:	

Field calibration record:

Date calibrated	DO	Conductivity	pH 4.0	pH 6.88	Temperature

Interface probe (IP)					
Equipment description:			Equipment serial number:		
Recommended service frequency:		Last service date:		Serviced by:	

Field challenge details:

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

DAILY FIELD SUMMARY WITH CALIBRATION RECORD

TETRA TECH COFFEY

Project name:	PERDAMAN	Project Number:	754_PERGN295751		
Field personnel:	NICK TAYLOR	Date:	26/1/22		
Project manager:	BERNIE WEEKES	Page:	1	of	1

Time	Description of Tasks Undertaken: Include details onsite, all personnel, standby, phone calls)
06:00AM	PRE - START
06:30AM	DRILLING
12:00PM	HAND AUGERING ON CAUSEWAY
13:45PM	STOP FIELDWORKS FOR DAY - QA/QC
13:30PM	LEAVE SITE FOR ACCOM.

TETRA TECH COFFEY

Job/site details:			
Project name:	PERDAMAN	Project Number:	754 - PERN29575
Fieldwork date(s):	21/1/22 – 31/1/22	Work completed by:	NICK TAYLOR
Type of work (ESA, GME etc)	ESA		

Photoionisation Detector (PID)					
Equipment description:	MINIRAE 3000		Equipment serial number:	MR 3000 L	
Recommended calibration frequency:	DAILY	Last calibration date:	21/1/22	Calibrated by:	ECO-ENVIRONMENTAL NICK TAYLOR
Challenge gas standard:	UN1956	Gas batch #:	WO279952-3	Gas expiry date:	14-DEC-2025

Field challenge details:

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail
26/1/22	05:00am	PASS						

Lower explosive level (LEL) meter (or multi gas meter)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Challenge gas standard:		Gas batch #:		Gas expiry date:	
Field challenge details:		If recorded on hot work permit, record HWP number here:			

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

Water quality meter (WQM)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Calibration standards:		Batch #:		Gas expiry date:	

Field calibration record:

Date calibrated	DO	Conductivity	pH 4.0	pH 6.88	Temperature

Interface probe (IP)					
Equipment description:			Equipment serial number:		
Recommended service frequency:		Last service date:		Serviced by:	

Field challenge details:

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

DAILY FIELD SUMMARY WITH CALIBRATION RECORD

TETRA TECH COFFEY

Project name:	PERDAMAN	Project Number:	754_PEREN295751
Field personnel:	NICK TAYLOR	Date:	27/1/22
Project manager:	BERNIE WEEKES	Page:	1 of 1

Time	Description of Tasks Undertaken: Include details onsite, all personnel, standby, phone calls)
06:00AM	PRE-START
06:30AM	DRILLING
08:00AM	FETCH COMPRESSOR – SA & CAFSIDER
10:00AM	INSTALL MW10 – AIR HAMMER
12:00AM	~~RETURN COMPRESSOR~~ DRILL OTHER LOCATIONS
14:00PM	RETURN COMPRESSOR
15:00PM	TOOL IPEC
16:00PM	RETURN TO ACCOMMODATION.

TETRA TECH COFFEY

Job/site details:			
Project name:	PERDAMAN	Project Number:	75_PERGN295751
Fieldwork date(s):	21/1/22 – 31/1/22	Work completed by:	27/1/22
Type of work (ESA, GME etc)	ESA		

Photoionisation Detector (PID)					
Equipment description:	MINI RAE 3000	Equipment serial number:	MR3000 1		
Recommended calibration frequency:	DAILY	Last calibration date:	21/1/22	Calibrated by:	ECO_GW.
Challenge gas standard:	UN1956	Gas batch #:	W027997523	Gas expiry date:	14/12/25

Field challenge details:

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail
27/1/22	05:00AM	PASS.						

Lower explosive level (LEL) meter (or multi gas meter)					
Equipment description:		Equipment serial number:			
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Challenge gas standard:		Gas batch #:		Gas expiry date:	
Field challenge details:		If recorded on hot work permit, record HWP number here:			

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

Water quality meter (WQM)					
Equipment description:		Equipment serial number:			
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Calibration standards:		Batch #:		Gas expiry date:	

Field calibration record:

Date calibrated	DO	Conductivity	pH 4.0	pH 6.88	Temperature

Interface probe (IP)					
Equipment description:		Equipment serial number:			
Recommended service frequency:		Last service date:		Serviced by:	

Field challenge details:

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

DAILY FIELD SUMMARY WITH CALIBRATION RECORD

TETRA TECH COFFEY

Project name:	PERDAMAN	Project Number:			
Field personnel:	NT/CR	Date:	8/2/22		
Project manager:	BW	Page:	1	of	1

Time	Description of Tasks Undertaken: Include details onsite, all personnel, standby, phone calls)
08:30AM	FLY IN — PICK UP CAR.
	WAIT FOR SANJANA AUDIT TO GET
	KEYS FOR STORAGE ROOM TO BE ABLE
	TO ACCESS EQUIPMENT
09:30AM	GO TO ACCOMMODATION & CHECK-IN.
10:00AM	SORT FIELD EQUIPMENT & BOTTLES.
	PHONE BW FOR CLARIFICATION ON
	SAQP. FETCH ICE.
11:15AM	GO TO IGA FOR SUPPLIES.
11:45AM	GO TO KARRATHA AIRPORT TO
	MEET SANJANA AUDIT AS SHE
	HAS IP.
12:15PM	HEAD TO MAC FOR CHARLIE ROLFE'S
	HERITAGE INDUCTION.
12:45PM	HERITAGE INDUCTION.
13:45PM	TO SITE — PRE-START.
14:15PM	DIP ROUND & ACCESS CHECK.
15:45PM	END OF DIP ROUND. CALL BW.
16:00PM	END OF DAY. HEAD BACK TO ACCOMMODATION.

DAILY FIELD SUMMARY WITH CALIBRATION RECORD

TETRA TECH COFFEY

Project name:	PERDAMAN
Field personnel:	NT &CR
Project manager:	BW

Project Number:	754_PEREN[redacted]295751		
Date:	9/2/22		
Page:	1	of	1

Time	Description of Tasks Undertaken: Include details onsite, all personnel, standby, phone calls)
06:00	PRE-START
06:15	~~TRIED TO SAMPLE MW09 WITH PO~~
	SAMPLING GROUNDWATER WELLS.
15:45	ATTEMPT TO RE-SAMPLE MW09 WITH
	PERI-PUMP FOLLOWING CONCERNS ABOUT
	USE OF BAILER. HOWEVER LIGHTNING
	STORM & TORRENTIAL RAIN OCCUR,
	STOPPING WORK. END OF DAY.

DAILY FIELD SUMMARY WITH CALIBRATION RECORD

TETRA TECH COFFEY

Project name:	PERDAMAN	Project Number:	754-PERGN2[redacted] 245751
Field personnel:	NT & CR	Date:	10/2/22
Project manager:	BW	Page:	1 of 1

Time	Description of Tasks Undertaken: Include details onsite, all personnel, standby, phone calls)
05:30	ORGANISING BOTTLES & EQUIPMENT & CALIBRATING WQ METER
06:45	PRE-START.
07:00	MW09 INUNDATED, ∴ CANNOT SAMPLE WITH PUMP. THEREFORE, HEAD TO CAUSEWAY.
10:00	FINISHED CAUSEWAY & RESAMPLING MW07 & MW08. HEAD TO SITE F.
12:00	NEED LONGER BAILER STRING FOR SAMPLING MW04. HEAD TO MITRE 10 @ KARRATHA INDUSTRIAL ESTATE. ENCOUNTER WITH LADY FROM NAC.
13:00	BACK ON SITE – SAMPLE MW04. – REFERRED TO BW & CLIENT.
13:30	LEAVE PERDAMAN SITE FOR ACCOMMODATION & ONTO NICKOL BAY HOSPITAL SITE TO SAMPLE 2 WELLS -
14:45	ON NICKOL BAY SITE.
17:00	FINISHED @ NICKOL BAY. END OF DAY.

coffey

Well Gauging Form

PROJECT NAME: Perdaman

PROJECT NUMBER: 754-PEREN29 5751

FIELD PERSONNEL: Nick Taylor + Charlie Rolfe

DATE: 8/02/22

PROJECT MANAGER: Bernie Weakes

FIELD EQUIPMENT:

Equipment Used: IP

IP Serial Number:

REFER TO SOPs WHEN GAUGING WELLS:

SOP - Monitoring Well Gauging and SOP – Decontamination of Sampling Equipment

Time of Day	Well ID	Well Diameter	Total Well Depth **note 1**	Depth to PSH (NAPL) [A]	Depth to Groundwater [B]	PSH Thickness [B-A]	Height of Well Stick-Up	COMMENTS (**notes 2 & 3**) ODOUR, COLOUR, SHEEN, NAPL (and its colour), REMEDIATION SYSTEM, etc
		mm	m	mBTOC	mBTOC	mm	m	
14:15	BH22	50	12.240	-	10.955	-	0.69	
14:30	MW10	50	2.37	-	1.01	-		
14:40	MW03	50	2.97	-	0.55	-	0.46	
14:42	BH12	50	11.78	-	1.145	-	0.77	
14:52	MW02	50	3.27	-	0.815	-	0.60	
	~~MW04~~							
14:57	BH27	50	10.82	-	0.86	-		
15:04	MW09	50	3.88	-	0.41	-	0.43	
15:09	MW01	50	10.04	-	7.84	-		
15:20	MW07	50	1.95	-	0.915	-	0.92	
15:22	MW08	50	1.70	-	1.13	-	0.98	
15:32	MW06	50	12.15	-	6.505	-	0.91	
15:37	BH31	50	0.52	-	8.37	-	0.52	
15:40	MW04	50	0.62	-	21.61	-	0.62	
15:45	MW05	50	0.84	-	7.625	-	0.84	

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman
PROJECT NUMBER: 754-PEREM 295751
FIELD PERSONNEL: NT + CR
DATE: 10/2/22
PROJECT MANAGER: DW

WELL ID: MW05 **DIAMETER:** _____ mm **WELL DEPTH:** 19.2 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.84 mm

FIELD EQUIPMENT
Equipment ID: _____
WQ Meter ID: _____
WQ Meter Type: _____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: _____ m below TOC
After Pump Installation: _____ m below TOC
Pump Intake Depth: _____
Equipment Volume: _____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
11:14			7.62	76.1		5718		6.79		-80.8		30.0		✓					
11:17			7.86	69.1		5490		5.91		-91.2		29.0							
11:20			7.98	31.5		5327		6.76		-107.4		29.1							
11:23			8.12	36.8		5206		6.79		-112.4		29.4							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____
WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman

PROJECT NUMBER: 754-PEREN295751

FIELD PERSONNEL: NT + CR

DATE: 10/02/22

PROJECT MANAGER: BW

WELL ID: MW04 **DIAMETER:** _____ mm **WELL DEPTH:** 0.62 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.62 ~~mm~~ m

FIELD EQUIPMENT

Equipment ID: _____

WQ Meter ID: _____

WQ Meter Type: _____

FIELD EQUIPMENT

Depth to Water - Before Pump Installation: _____ m below TOC

After Pump Installation: _____ m below TOC

Pump Intake Depth: _____

Equipment Volume: _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
			21.59																
				Insufficient Sample															
STABILISATION CRITERIA (3 readings within following ranges)				**± 10%**		**± 3%**		**± 0.1 unit**		**± 10mV**		**± 0.2°C**							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____

TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell + tubing
2 Drawdown during pumping to be limited to <100 mm where possible

coffey

Total depth: 2.37

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman

PROJECT NUMBER: 754-PEREN295751

FIELD PERSONNEL: Nick Taylor + Charlie Rolfe

DATE: 9/02/22

PROJECT MANAGER: Bernie Weakes

WELL ID: MW10 **DIAMETER:** 50 mm **WELL DEPTH:** 2.37 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** _____ mm

FIELD EQUIPMENT

Equipment ID: _____

WQ Meter ID: _____

WQ Meter Type: _____

FIELD EQUIPMENT

Depth to Water - Before Pump Installation: _____ m below TOC

After Pump Installation: _____ m below TOC

Pump Intake Depth: _____

Equipment Volume: _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
6:40	350		1.01	5.4		7599		7.22		70.6		30.7		✓					
6:43	350		1.025	30.8		7635		7.73		62.9		31.4							
6:46	350		1.025	22.1		7858		7.78		63.6		31.4							
6:49	350		1.03	18.2		8396		7.77		66.6		31.4							
6:52	350		1.03	17.1		8607		7.76		67.8		31.4							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☑ N ☐ DUPLICATE ID: QC01

TRIPLICATE COLLECTED: Y ☑ N ☐ TRIPLICATE ID: QC02

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman
PROJECT NUMBER: 754-PEREN295751
FIELD PERSONNEL: Nick Taylor + Charlie Rolfe
DATE: 9/02/22
PROJECT MANAGER: Bernie Weakes

WELL ID: BH12 **DIAMETER:** 50 mm **WELL DEPTH:** 11.78 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.77 m

FIELD EQUIPMENT
Equipment ID: _____
WQ Meter ID: _____
WQ Meter Type: _____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: _____ m below TOC
After Pump Installation: _____ m below TOC
Pump Intake Depth: _____
Equipment Volume: _____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
~~7:41~~			~~1.155~~	~~105.3~~		~~103253~~		~~6.87~~		~~-100.4~~		~~30.8~~							
~~7:44~~																			
7:51	350		1.28	2.5		124886		7.04		-141.6		31.0		✓					No odour
7:53	350		1.355	3.5		134096		6.99		-133.9		30.8							
7:56	350		1.401	2.1		148815		6.92		-117.8		30.4							
7:59	350		1.401	2.5		154930		6.92		-115.1		30.3							
8:02	350		1.415	2.9		160556		6.90		-115.3		30.1							
8:05	350		1.415	2.7		164862		6.87		-111.8		29.9							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

* Inlet to low flow cell leaking

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman
PROJECT NUMBER: 754-PERENZ95751
FIELD PERSONNEL: NT+CR
DATE: 9/02/22
PROJECT MANAGER: Bernie Weakes

WELL ID: MW02 **DIAMETER:** 50 mm **WELL DEPTH:** 3.27 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.6 m ~~mm~~

FIELD EQUIPMENT
Equipment ID: _____
WQ Meter ID: _____
WQ Meter Type: _____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: _____ m below TOC
After Pump Installation: _____ m below TOC
Pump Intake Depth: _____
Equipment Volume: _____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l) * See Note		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
9:24			0.805	107.0		177352		6.56		201.7		32.3		✓					NO ODOUR
9:27			0.835	91.2		177345		7.01		171.4		32.3							
9:30			0.835	80.6		177021		7.03		151.0		32.3							
9:33			0.84	65.7		176888		7.04		137.0		32.2							
9:36			0.84	83.1		176588		7.04		128.2		32.2							
9:39			0.84	97.2		176677		7.04		121.4		32.1							
9:42			0.84	77.1		176602		7.05		115.7		32.2							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

* Inlet to Flow through cell leaking

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman
PROJECT NUMBER: 754- PEREN 245751
FIELD PERSONNEL: NT + CR
DATE: 9/02/22
PROJECT MANAGER: Bernie Weakes

WELL ID: MW03 **DIAMETER:** 50 mm **WELL DEPTH:** 2.97 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.46 m

FIELD EQUIPMENT
Equipment ID: _____
WQ Meter ID: _____
WQ Meter Type: _____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: _____ m below TOC
After Pump Installation: _____ m below TOC
Pump Intake Depth: _____
Equipment Volume: _____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l) * See Note		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
8:40			0.545	54		120774		6.66		188.7		30.4		✓					
8:43			0.565	38.9		120610		7.76		127.8		30.1							
8:46			0.565	26.6		120169		7.68		116.0		30.2							
8:49			0.565	18.2		119977		7.60		106.0		30.1							
8:52			0.565	16.2		119931		7.56		98.1		30.1							
8:55			0.565	13.2		119910		7.51		94.1		30.2							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

2* ~~outlet~~ inlet to flow through cell leaking.

coffey

Groundwater Sampling Form (A) General

micropurge

1* Bottom indistinct may be silty

PROJECT NAME: Pendoman **PROJECT NUMBER:** 754-PERENZ95751

FIELD PERSONNEL: NT + CR **DATE:** 9/2/22

PROJECT MANAGER: Bernie Weakes

WELL ID: MBH27 **METER ID& TYPE :** **TOTAL WELL DEPTH:** 10.82 *1 **SCREEN INTERVAL:**

EQUIPMENT USED: BAILER ☐ **WATERRA** ☐ **OTHER** **WELL DIAMETER:** **WELL STICK-UP:**

WELL GAUGING AND PURGE VOLUME CALCULATIONS

(TOTAL WELL DEPTH) – (DEPTH TO WATER) = (WATER COLUMN)

_____m - _____ = _____m

Use water column calculation together with the procedures in 'SOP- Groundwater Sampling - Bailers' to determine the correct volume to be purged from the well (enter this value in the field to the right)

LITRES PER 1 WELL VOLUME

_____L

WELL HEADSPACE PID READING

PID READING

PPM: _____

ORP REFERENCE ELECTRODE: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L)	DEPTH TO WATER (m)	DISSOLVED OXYGEN (mg/l) *2		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
10:12			0.87	90.7		182204		6.31		170.1		32.0							
10:15			1.07	93.2		183728		6.72		71.2		30.9							
10:19			1.05	89.7		185560		6.76		105.6		30.1							
10:22			1.05	66.8		186936		6.77		88.3		29.9							
10:25			1.05	93.2		188560		6.77		78.5		29.6							
10:28			1.05	95.2		189899		6.78		71.1		29.4							
10:31			1.05	94.2		189810		6.77		67.5		29.3							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____ **TRIPLICATE COLLECTED:** Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

* Not enough water for all samples - PFAS - MNA
well purged dry almost.

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman **PROJECT NUMBER:** 754-PEREN

FIELD PERSONNEL: NT + CR **DATE:** 9/02/22

PROJECT MANAGER: BW

WELL ID: MW07 **DIAMETER:** _____ mm **WELL DEPTH:** 1.95 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.92 m ~~mm~~

FIELD EQUIPMENT

Equipment ID: _____

WQ Meter ID: _____

WQ Meter Type: _____

FIELD EQUIPMENT

Depth to Water - Before Pump Installation: _____ m below TOC Pump Intake Depth: _____

After Pump Installation: _____ m below TOC Equipment Volume: _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
12:08			0.92	12.7		188619		7.01		186.1		30.6							
12:11			1.75	29.3		189685		7.08		167.6		31.0							
12:14																			
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____ **TRIPLICATE COLLECTED:** Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☐ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes: 1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm w.c.

* Reduced flow significantly to ~ 50ml/min, however bore ran dry collected - metals - PFAS - MDEA

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman

PROJECT NUMBER: 754-PEREN295751

FIELD PERSONNEL: NT + CR

DATE: 10/2/22

PROJECT MANAGER: BW

WELL ID: MW07 **DIAMETER:** _____ mm **WELL DEPTH:** ~~0.91~~ 1.95 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** _____ mm

FIELD EQUIPMENT

Equipment ID: _____

WQ Meter ID: _____

WQ Meter Type: _____

FIELD EQUIPMENT

Depth to Water - Before Pump Installation: _____ m below TOC

After Pump Installation: _____ m below TOC

Pump Intake Depth: _____

Equipment Volume: _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
7:27			0.91	94.4		185223		6.77		280		28.8		✓					
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____

TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes: 1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <10%

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* inlet to flow through cell broken

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman
PROJECT NUMBER: 754 - PEREN295751
FIELD PERSONNEL: NT + CR
DATE: 10/2/22
PROJECT MANAGER: BW

WELL ID: MW06 **DIAMETER:** 50 mm **WELL DEPTH:** 12.15 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.91 m ~~mm~~

FIELD EQUIPMENT
Equipment ID: _____
WQ Meter ID: _____
WQ Meter Type: _____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: _____ m below TOC
After Pump Installation: _____ m below TOC
Pump Intake Depth: _____
Equipment Volume: _____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l) * see note		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
9:28			6.51	83.7		5475		7.03		-26.1		29.0		✓					Slightly organic odour
9:31			6.93	840		5184		6.98		-68.6		29.0							
*water level after sampling 7.525 → 0.5cm recovery in 5mins																			
* Air bubbles noticed in line																			
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes: 1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

* following bailing final water level 9.34 mbtoc
Bailer Low flow - MDEA
- PFAS (rest bailed)

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdoman
PROJECT NUMBER: 754-PERENZ95751
FIELD PERSONNEL: NT + CR
DATE: 10/2/22
PROJECT MANAGER: BW

WELL ID: BH31 **DIAMETER:** 50 mm **WELL DEPTH:** 11.67 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.52 m ~~mm~~

FIELD EQUIPMENT
Equipment ID: _____
WQ Meter ID: _____
WQ Meter Type: _____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: _____ m below TOC
After Pump Installation: _____ m below TOC
Pump Intake Depth: _____
Equipment Volume: _____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
10:11			8.37	52.7		7028		7.38		-79.2		29.5				✓			Slight organic odour
10:14			8.51	51.7		7230		7.42		-99.2		29.0							
10:17			8.605	89.2		7111		7.74		-98.3		29.3							
	8.69	dry	→ bailer																
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____
WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes: 1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell tubing
2 Drawdown during pumping to be limited to <100 mm where

*insufficient water to purge

coffey

Groundwater Sampling Form (A) - General

PROJECT NAME: Perdaman **PROJECT NUMBER:** 154-PEREN

FIELD PERSONNEL: NT + CR **DATE:** 9/02/22

PROJECT MANAGER: BW

WELL ID: MW08 **METER ID& TYPE :** **TOTAL WELL DEPTH:** 1.70 **SCREEN INTERVAL:**

EQUIPMENT USED: BAILER ☑ **WATERRA** ☐ **OTHER** **WELL DIAMETER:** **WELL STICK-UP:** 0.98m

WELL GAUGING AND PURGE VOLUME CALCULATIONS

(TOTAL WELL DEPTH) – (DEPTH TO WATER) = (WATER COLUMN)

_____m - _____ = _____m

Use water column calculation together with the procedures in 'SOP- Groundwater Sampling - Bailers' to determine the correct volume to be purged from the well (enter this value in the field to the right)

LITRES PER 1 WELL VOLUME

_____L

WELL HEADSPACE PID READING

PID READING

PPM: _____

ORP REFERENCE ELECTRODE: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L)	DEPTH TO WATER (m)	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
13:16			1.14	12.1		142174		7.15		93.5		31.6							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____ **TRIPLICATE COLLECTED:** Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☐ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

coffey

Groundwater Sampling Form (B) – Micro Purge

1min 24sec

PROJECT NAME: Perda mall

PROJECT NUMBER: 754-PEREN245751

FIELD PERSONNEL: NT + CR

DATE: 10/2/22

PROJECT MANAGER: BW

WELL ID: MW08 **DIAMETER:** _____ mm **WELL DEPTH:** 1.7 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** _____ mm

FIELD EQUIPMENT

Equipment ID: _____

WQ Meter ID: _____

WQ Meter Type: _____

FIELD EQUIPMENT

Depth to Water - Before Pump Installation: _____ m below TOC

After Pump Installation: _____ m below TOC

Pump Intake Depth: _____

Equipment Volume: _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
7:50	350		1.06	96.1		148884		7.13		137.6		30.1		✓					
7:53	350		1.16	99.4		142980		7.29		126.9		29.3							
7:56	350		1.16	97.3		144574		7.20		110.2		29.1							
7:59	350		1.16	96.8		147614		7.18		102.3		29.2							
8:02	350		1.165	96.6		147087		7.16		98.3		29.2							
8:05	350		1.165	97.4		145038		7.15		93.4		29.3							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☑ N ☐ DUPLICATE ID: QC06

TRIPLICATE COLLECTED: Y ☑ N ☐ TRIPLICATE ID: QC07

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes: 1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

* Significant drawdown in well to 8.6m ∴ took sample without equilibration due to low permeability - Air noted in sample.

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman
PROJECT NUMBER: 754-PEREN295751
FIELD PERSONNEL: NT + CR
DATE: 9/02/22
PROJECT MANAGER: BW

WELL ID: MW01 **DIAMETER:** _____ mm **WELL DEPTH:** 10.04 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** _____ mm

FIELD EQUIPMENT
Equipment ID: _____
WQ Meter ID: _____
WQ Meter Type: _____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: _____ m below TOC
After Pump Installation: _____ m below TOC
Pump Intake Depth: _____
Equipment Volume: _____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
15:38			7.83	5.9		9782		6.63		-178.5		30.0		✓					
15:41			8.09	5.0		9070		6.56		-169.2		28.7							
15:44			8.19																
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

* Insufficient water to purge → used bailer

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman
PROJECT NUMBER: 754-PEREN295751
FIELD PERSONNEL: NT + CR
DATE: 9/02/22
PROJECT MANAGER: BW

WELL ID: BH22 **DIAMETER:** ____ mm **WELL DEPTH:** 12.240 m **SCREEN INTERVAL:** ____ to ____ m below TOC **STICK-UP:** 0.64 m

FIELD EQUIPMENT
Equipment ID: ____
WQ Meter ID: ____
WQ Meter Type: ____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: ____ m below TOC
After Pump Installation: ____ m below TOC
Pump Intake Depth: ____
Equipment Volume: ____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: ____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
14:44			10.955	0.3		7469		7.21		-116.4		29.6							Black
																			Organic odour
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: ____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: ____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes: 1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

coffey

Groundwater Sampling Form (A) - General

PROJECT NAME: Pecdaman **PROJECT NUMBER:** 754-PEREN 295751

FIELD PERSONNEL: NT + CR **DATE:** 9/02/22

PROJECT MANAGER: BW

WELL ID: MW039 **METER ID& TYPE :** **TOTAL WELL DEPTH:** 3.88 **SCREEN INTERVAL:**

EQUIPMENT USED: BAILER ☑ **WATERRA** ☐ **OTHER** **WELL DIAMETER:** 50 **WELL STICK-UP:** 0.43

WELL GAUGING AND PURGE VOLUME CALCULATIONS

(TOTAL WELL DEPTH) – (DEPTH TO WATER) = (WATER COLUMN)

3.88 m - 0.44 = 3.44 m

Use water column calculation together with the procedures in 'SOP- Groundwater Sampling - Bailers' to determine the correct volume to be purged from the well (enter this value in the field to the right)

LITRES PER 1 WELL VOLUME 6 L 30L Purged

WELL HEADSPACE PID READING

PID READING

PPM:

ORP REFERENCE ELECTRODE: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

$\pi \times 0.025^2$ - 0.002 × water col

0.006

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L)	DEPTH TO WATER (m)	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
11:30	–		0.44	20.3		14166 2		6.84		77.2		29.5					✓		Pale brown
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: **TRIPLICATE COLLECTED:** Y ☐ N ☑ TRIPLICATE ID:

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

* unable to sample

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman

PROJECT NUMBER: 754-PERENZ95751

FIELD PERSONNEL: CR + NT

DATE: 9/02/22 + 10/02/22

PROJECT MANAGER: BW

WELL ID: MW09 **DIAMETER:** _____ mm **WELL DEPTH:** 3.88 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** _____ mm

FIELD EQUIPMENT

Equipment ID: _____

WQ Meter ID: _____

WQ Meter Type: _____

FIELD EQUIPMENT

Depth to Water - Before Pump Installation: _____ m below TOC

After Pump Installation: _____ m below TOC

Pump Intake Depth: _____

Equipment Volume: _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
			0.445																
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☐ DUPLICATE ID: _____

TRIPLICATE COLLECTED: Y ☐ N ☐ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☐ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☐ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

APPENDIX G: BORE LOGS

DRAFT

Environmental Field Log - Borehole

TETRA TECH COFFEY

Borehole No. ASS1

Sheet of

Client:	Clough	Project No.	754-PEREN295751
Project:	*Perdaman Contam and ASS*	Date started:	28-Jan
Site Address:		Date completed:	

Drill model:	*Push Probe*	Drill mounting:		Hole dia (mm):		Logged by:	SA	Checked by:	
GPS Co-ord:	476026, 7718206	GPS Datum:		R.L. surface (AHD):				Inclination:	

Equipment used:	Equipment Type (PID or other)	MR3000-592-000670 (PID)	Equipment Serial number:	
	Equipment Type (PID or other)		Equipment Serial number:	

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
				sample at 0	0	0			Dry		
				Sample at 0.25				sandy GRAVEL with calcrete, brown, coarse, well sorted, sub-angular			
				Sample at 0.5							
				Sample at 0.75							
		V		Sample at 1.0		1					
				Sample at 1.25							
				Sample at 1.5							
				Sample at 1.75				sandy CLAY with calcrete, coarse, white/grey, well sorted, sub rounded			
				Sample at 2.0		2					
				Sample at 2.25							
				Sample at 2.50							
				Sample at 2.75							
				Sample at 3.0		3					

Initial water level:	(after mins.)	Static water level:	(after mins.)

Method
- DT diatube
- PT push tube
- SS solid stem flight auger
- HS hollow stem flight auger
- V, T V bit, TC bit
- AH air hammer
- CP cable percussive
- NMLC NMLC core
- HA Hand auger
- NDD Non-Destructive Digging

Support
- C casing
- DF drilling fluid
- N none

Water
- ▶ inflow
- ◀ outflow
- ▽ initial water level (after excavation)
- ▼ standing water level @ time/date

Grading
- Wg well graded
- Pg poorly graded
- Gg gap graded
- U uniform

Grainsize
- F fine
- M medium
- C coarse

Plasticity
- Lp low plasticity
- Mp medium plasticity
- Hp high plasticity

Weathering Terms
- Fr Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremely Weathered
- RS Residual Soil

Moisture
- D dry
- M moist
- W wet

Colour
- R red
- W white
- G grey
- P purple
- Y yellow
- Bl Black
- Br Brown
- O Orange
- G Green
- B Blue

Consistency
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable

Density
- VL very loose
- L loose
- MD med. dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. ASS2

Sheet of

Client:	Clough					Project No.	754-PEREN295751		
Project:	*Perdaman Contam and ASS*					Date started:	28-Jan		
Site Address:						Date completed:			
Drill model:	*Push Probe*	Drill mounting:		Hole dia (mm):		Logged by:	SA	Checked by:	
GPS Co-ord:		GPS Datum:		R.L. surface (AHD):				Inclination:	
Equipment used:	Equipment Type (PID or other)	MR3000-592-000670 (PID)		Equipment Serial number:					
	Equipment Type (PID or other)			Equipment Serial number:					

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
				sample at 0	0	0		0-0.1 sandy GRAVEL with granophyre, brown, grey coarse, well sorted, sub-angular	Dry		
				Sample at 0.25				0.1 - 0.3 clayey SAND, with granophyre, coarse, green/grey/brown, well sorted, sub rounded to sub-angular. Refusal at 0.3m			
						1					
						2					
						3					

Initial water level:	(after mins.)	Static water level:	(after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. ASS3

Sheet of

Client:	Clough					Project No.	754-PEREN295751		
Project:	*Perdaman Contam and ASS*					Date started:	28-Jan		
Site Address:						Date completed:			
Drill model:	*Push Probe*	Drill mounting:		Hole dia (mm):		Logged by:	SA	Checked by:	
GPS Co-ord:		GPS Datum:		R.L. surface (AHD):				Inclination:	
Equipment used:	Equipment Type (PID or other)	MR3000-592-000670 (PID)		Equipment Serial number:					
	Equipment Type (PID or other)			Equipment Serial number:					

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
				sample at 0	0	0			Dry		
								0-0.4 sandy GRAVEL with granophyre, brown, coarse, well sorted, sub-angular			
				Sample at 0.25							
				Sample at 0.50							
								0.4 - 0.9 gravelly SAND, with granophyre, coarse, grey/brown, well sorted, sub rounded to sub-angular. Refusal at 0.9m			
				Sample at 0.75							
				Sample at 0.90							
						1					
						2					
						3					

Initial water level:	(after mins.)	Static water level:	(after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. ASS4

Sheet of

Client:	Clough	Project No.	754-PEREN295751
Project:	*Perdaman Contam and ASS*	Date started:	28-Jan
Site Address:		Date completed:	

Drill model:	*Push Probe*	Drill mounting:		Hole dia (mm):		Logged by:	SA	Checked by:	
GPS Co-ord:		GPS Datum:		R.L. surface (AHD):				Inclination:	

Equipment used:	Equipment Type (PID or other)	MR3000-592-000670 (PID)	Equipment Serial number:	
	Equipment Type (PID or other)		Equipment Serial number:	

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
				sample at 0	0	0			Dry		
				sample at 0.25				0-0.3 sandy SILT, fine, red/brown, sub-rounded, well sorted, with gravel			
				Sample at 0.5				0.3 - 0.5 - sandy SILT, grey, coarse, sub-rounded to sub-angular, well sorted, with granophyre			
								0.5 - 0.7 Granophyre, grey, coarse, sub-angular, poorly sorted			
				sample at 0.75							
				Sample at 1.0		1		0.7 - 1.3 - sandy CLAY, coarse, red/brown, mottled, sub-rounded, sub angular, well sorted, with some gravel			
				Sample at 1.25							
						1.3					
						2					

Initial water level:	(after mins.)	Static water level:	(after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. ASS5

Sheet of

Client:	Clough					Project No.	754-PEREN295751		
Project:	*Perdaman Contam and ASS*					Date started:	28-Jan		
Site Address:						Date completed:			
Drill model:	*Push Probe*	Drill mounting:		Hole dia (mm):		Logged by:	SA	Checked by:	
GPS Co-ord:		GPS Datum:		R.L. surface (AHD):				Inclination:	
Equipment used:	Equipment Type (PID or other)	MR3000-592-000670 (PID)		Equipment Serial number:					
	Equipment Type (PID or other)			Equipment Serial number:					

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
				sample at 0	0	0			Dry		
				sample at 0.25				0-0.7 sandy SILT, fine, brown, sub-rounded to sub-angular, well sorted, with granophyre			
				Sample at 0.5							
				sample at 0.75				0.7 - 0.9- sandy CLAY, fine, mottled, brown/red/yellow/grey, sub-rounded to sub-angular, well sorted, with granophyre. Refusal at 0.9m			
				sample at 0.90		0.9					
						1					
						2					

Initial water level:	(after mins.)	Static water level:	(after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. ASS21

Sheet of

Client:	Clough	Project No.	754-PEREN295751
Project:	*Perdaman Contam and ASS*	Date started:	28-Jan
Site Address:		Date completed:	
Drill model:	*Push Probe*	Drill mounting:	
Hole dia (mm):		Logged by:	SA
Checked by:		GPS Co-ord:	476112, 7718767
GPS Datum:		R.L. surface (AHD):	
Inclination:		Equipment used:	Equipment Type (PID or other): MR3000-592-000670 (PID)
Equipment Serial number:		Equipment Type (PID or other):	
Equipment Serial number:			

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
				sample at 0	0	0			Dry		
				Sample at 0.25	0	0.25		sandy GRAVEL, coarse, brown, grey, sub angular, well sorted, with calcrete and granophyre			

Initial water level: (after mins.) Static water level: (after mins.)

Method
- DT diatube
- PT push tube
- SS solid stem flight auger
- HS hollow stem flight auger
- V, T V bit, TC bit
- AH air hammer
- CP cable percussive
- NMLC NMLC core
- HA Hand auger
- NDD Non-Destructive Digging

Support
- C casing
- DF drilling fluid
- N none

Water
- ▶ inflow
- ◀ outflow
- ▽ initial water level (after excavation)
- ▼ standing water level @ time/date

Grading
- Wg well graded
- Pg poorly graded
- Gg gap graded
- U uniform

Grainsize
- F fine
- M medium
- C coarse

Plasticity
- Lp low plasticity
- Mp medium plasticity
- Hp high plasticity

Weathering Terms
- Fr Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremely Weathered
- RS Residual Soil

Moisture
- D dry
- M moist
- W wet

Colour
- R red
- W white
- G grey
- P purple
- Y yellow
- Bl Black
- Br Brown
- O Orange
- G Green
- B Blue

Consistency
- VS very soft
- S soft
- F firm
- St stiff
- VS very stiff
- H hard
- Fb friable

Density
- VL very loose
- L loose
- MD med. dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. ASS22

Sheet of

Client:	Clough					Project No.	754-PEREN295751		
Project:	*Perdaman Contam and ASS*					Date started:	12-Feb		
Site Address:						Date completed:			
Drill model:	*Push Probe*	Drill mounting:		Hole dia (mm):		Logged by:	SA	Checked by:	
GPS Co-ord:		GPS Datum:		R.L. surface (AHD):				Inclination:	
Equipment used:	Equipment Type (PID or other)	MR3000-592-000670 (PID)		Equipment Serial number:					
	Equipment Type (PID or other)			Equipment Serial number:					

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
				sample at 0	0	0					
				Sample at 0.25				sandy GRAVEL with calcrete, brown, coarse, well sorted, sub-angular	Dry		
				Sample at 0.5							
				Sample at 0.75							
				Sample at 1.0		1					
				Sample at 1.25				sandy CLAY, coarse, white/grey, well sorted, sub rounded, with some gravel (calcrete)	Dry		
				Sample at 1.5							
				Sample at 1.75							
				Sample at 2.0		2					
						3					

Initial water level: (after mins.) Static water level: (after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. ASS8

Sheet 1 of 1

Client:	CLOUGH	Project No.	754_PEKEN2915751
Project:	PERDAMAN CONTAMINATION & ASS INVESTIGATION	Date started:	24/1/22
Site Address:		Date completed:	24/1/22

Drill model:	HOLLOW STEM AUGER	Drill mounting:		Hole dia (mm):	150	Logged by:	NT	Checked by:	
GPS Co-ord:		GPS Datum:		R.L. surface (AHD):				Inclination:	

Equipment used:	Equipment Type (PID or other)		Equipment Serial number:	
	Equipment Type (PID or other)		Equipment Serial number:	

Drilling information							Material substance					Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HS	N			ASS8_0		0		SANDY GRAVEL: RED-BROWN IN COLOUR. SUB-ROUNDED TO SUB-ANGULAR, POORLY SORTED. WITH FRAGMENTS OF GRANOPHYRE & SHELLS.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
				ASS8_0.25							
				ASS8_0.5		0.5		CLAY: BROWN IN COLOUR. DENSE WITH HIGH PLASTICITY.			
				ASS8_0.75							
				ASS8_1.0		1					
				ASS8_1.25							
				ASS8_1.5		1.5		CALCRETE: PINK-WHITE IN COLOUR WITH FRAGMENTS OF GRANOPHYRE.			
				ASS8_1.75							
				ASS8_2.0		2					
				ASS8_2.25							
				ASS8_2.5		2.5					
				ASS8_2.75							
				ASS8_3		3					

Initial water level: (after mins.) Static water level: (after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. MW09/SS23

Sheet 1 of 1

Client:	CLOUGH	Project No.	754-PERENZ15751
Project:	PERDAMAN CONTAMINATION & ASS INVESTIGATION	Date started:	24/1/22
Site Address:		Date completed:	24/1/22
Drill model:	HOLLOW STEM AUGER	Drill mounting:	Hole dia (mm): 150
Logged by:	NT	Checked by:	
GPS Co-ord:	GPS Datum:	R.L. surface (AHD):	Inclination:
Equipment used:	Equipment Type (PID or other)	Equipment Serial number:	
	Equipment Type (PID or other)	Equipment Serial number:	

Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HS	N	0.6m ▽		SS23 0m 0.4m SS23 0.5m SS23 1m		0 0.5 1 1.5 2 2.5 3 3.4m		CLAYEY GRAVEL: RED-BROWN IN COLOUR. SUB-ROUNDED TO SUB-ANGULAR FRAGMENTS OF GRANODIORITE IN A SILTY CLAY MATRIX WITH SHELLS CLAY: BROWN IN COLOUR WITH OCCASIONAL FRAGMENTS OF CALCRETE CLAY: GREY IN COLOUR WITH ROCK FRAGMENTS OF GRANODIORITE CLAY: CREAM IN COLOUR WITH ROCK FRAGMENTS OF GRANODIORITE.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION. GROUND BECAME HARDER AFTER 1.1m WITH MORE ROCKS PRESENT. LIKELY WEATHERED BEDROCK.

Initial water level: (after mins.) Static water level: (after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. AS510

Sheet | of |

Client:	CLOUGH	Project No.	754-PERAN215751
Project:	PERAMAN	Date started:	25/1/22
Site Address:	BUBKUB ROAD.	Date completed:	25/1/22
Drill model:	HOLLOW STEM AUGER	Drill mounting:	Hole dia (mm): 150
Logged by:	NT	Checked by:	
GPS Co-ord:		GPS Datum:	R.L. surface (AHD):
Inclination:			
Equipment used:	Equipment Type (PID or other)		Equipment Serial number:
	Equipment Type (PID or other)		Equipment Serial number:

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HS	N			AS510_0		0		SAND: ORANGE-BROWN. MEDIUM GRAINED, MODERATELY SORTED WITH MINOR CLAY.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
				AS510_0.25							
				~~AS510_0.25~~							
				AS510_0.75		0.75		CALCRETE: PINKY-WHITE, BECOMING GREY-WHITE WITH DEPTH WITH INCREASING GRANOPHYRE FRAGMENTS. CALCAREOUS IN NATURE & MOTTLED APPEARANCE, CLAYEY TEXTURE.			
				AS510_1.0							
				AS510_1.25							
				AS510_1.50							
				AS510_1.75							
				AS510_2.0							
				AS510_2.25							
				AS510_2.5							
				AS510_2.75							
				AS510_3.0		3.0		EOH			

Initial water level: (after mins.) Static water level: (after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. AS59

Sheet 1 of 1

Client:	CLOUGH	Project No.	754-PERENV57751
Project:	PERDAMAN	Date started:	25/1/22
Site Address:	BURRUP ROAD	Date completed:	25/1/22
Drill model:	HOLLOW STEM AUGER	Drill mounting:	Hole dia (mm): 150
Logged by:	NT	Checked by:	
GPS Co-ord:		GPS Datum:	R.L. surface (AHD):
Inclination:			

Equipment used:			
	Equipment Type (PID or other)		Equipment Serial number:
	Equipment Type (PID or other)		Equipment Serial number:

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HS	N			AS59-0				SANDY CLAY: BROWN, MEDIUM GRAINED, CLAY: ORANGE, HIGH PLASTICITY, FRAGMENTS OF GRANOPHYRE PRESENT.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
				AS59_0.25		0.25					
				AS59-0.5							
				AS59 0.75							
				AS59-1.0							
				AS59-1.25							
				AS59-1.5		1.5		CALCRETE: PINKY-PALE BROWN, BECOMING WHITE WITH DEPTH. MOTTLED APPEARANCE, CLAYEY TEXTURE, CALCAREOUS IN NATURE.			
				AS59-1.75							
				AS59-2.0							
				AS59-2.25							
				AS59-2.5							
				AS59-2.75							
				AS59-3.0		3.0		EOH			

Initial water level: (after mins.) Static water level: (after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. MW02

Sheet 1 of 1

Client:	CLOUGH			Project No.	75_PERTH 295751
Project:	PERDAMAN			Date started:	25/1/22
Site Address:	BURRUP ROAD			Date completed:	25/1/22
Drill model:	HOLLOW STEM AUGER	Drill mounting:	Hole dia (mm): 150	Logged by: NT	Checked by:
GPS Co-ord:		GPS Datum:	R.L. surface (AHD):		Inclination:

Equipment used:			
	Equipment Type (PID or other)		Equipment Serial number:
	Equipment Type (PID or other)		Equipment Serial number:

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HS	N			0.4		0		SANDY CLAY: BROWN TO PALE BROWN, MEDIUM GRAINED AND MODERATELY SORTED WITH COBBLES OF GRANOPHYRE IN PLACES.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
		▽0.6									
						2.6		GRANOPHYRE: GREY, XSTALLINE & FRESH IN NATURE.			
				2.8		2.8		EOH.			

Initial water level: (after mins.) Static water level: (after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. AS11

Sheet 1 of 1

Client:	CLOUGH	Project No.	754-PERTH20157S1
Project:	PERDAMAN	Date started:	25/11/22
Site Address:	RUKKUP ROAD	Date completed:	25/11/22
Drill model:	HOLLOW STEM AUGER	Drill mounting:	
Hole dia (mm):	150	Logged by:	NT
Checked by:		GPS Co-ord:	
GPS Datum:		R.L. surface (AHD):	
Inclination:		Equipment used:	Equipment Type (PID or other) / Equipment Serial number:
			Equipment Type (PID or other) / Equipment Serial number:

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HS	N			AS11-0	0	0		SANDY CLAY: RED-BROWN, MODERATELY SORTED & MEDIUM GRAINED WITH FRAGMENTS OF GRANOPHYRE.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
				AS11-0.25							
				AS11-0.5	0	0.5		CLAY: RED IN COLOUR WITH GRANOPHYRE FRAGMENTS, HIGH PLASTICITY,			
				AS11-0.75							
				AS11-1.0	0	1.0					
						1.1	XX	GRANOPHYRE: GREY, X-STALLINE, FRESH IN NATURE.			
								EOH.			

Initial water level: (after mins.) Static water level: (after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. AS12

Sheet 1 of 1

Client:	CLOUGH	Project No.	754-PERTH245751
Project:	PERDAMAN	Date started:	25/1/22
Site Address:	RURRUP ROAD	Date completed:	25/1/22
Drill model:	HOLLOW STEM AUGER	Drill mounting:	Hole dia (mm): 150
Logged by:	NTS	Checked by:	
GPS Co-ord:		GPS Datum:	R.L. surface (AHD):
Inclination:			
Equipment used:	Equipment Type (PID or other)	Equipment Serial number:	
	Equipment Type (PID or other)	Equipment Serial number:	

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HS	N			AS12-0		0		SANDY GRAVEL: RED-BROWN. POORLY SORTED WITH SUB-ANGULAR TO SUB-ROUNDED GRAINS OF CALCRETE AND GRANOPHYRE, SHELL FRAGMENTS PRESENT.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
				AS12-0.25							
				AS12-0.5							
				AS12-0.75							
				AS12-1.0							
				AS12-1.25							
				AS12-1.5		1.5		CALCRETE: RED-WHITE WITH AREAS OF GREY, MOTTLED APPEARANCE, CALCAREOUS, FRAGMENTS OF GRANOPHYRE PRESENT.			
				AS12-1.75							
				AS12-2.0							
				AS12-2.25							
				AS12-2.50							
				AS12-2.75							
				AS12-3.0		3.0		EOH			

Initial water level: (after mins.) Static water level: (after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. AS518

Sheet 1 of 1

Client:	CLOUGH	Project No.	754_PERGN295751
Project:	PERDAMAN	Date started:	25/1/22
Site Address:	RURRUP ROAD	Date completed:	25/1/22
Drill model:	HOLLOW STEM AUGER	Drill mounting:	Hole dia (mm): 150
Logged by:	NTC	Checked by:	
GPS Co-ord:		GPS Datum:	R.L. surface (AHD):
Inclination:			

Equipment used:			
	Equipment Type (PID or other)		Equipment Serial number:
	Equipment Type (PID or other)		Equipment Serial number:

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HS	N			AS518_0		0		CLAY: BROWN, HIGH PLASTICITY, FRAGMENTS OF CALCRETE.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
				AS518_0.25							
				AS518_0.5		0.5		CALCRETE: PINK-WHITE-BROWN. MOTTLED APPEARANCE, CALCAREOUS IN NATURE.			
				AS518_0.75							
				AS518_1.0							
				AS518_1.25							
				AS518_1.5							
				AS518_1.75							
				AS518_2.0							
				AS518_2.25							
				AS518_2.5							
						2.7		EOH			

Initial water level: (after mins.) Static water level: (after mins.)

Method
- DT diatube
- PT push tube
- SS solid stem flight auger
- HS hollow stem flight auger
- V, T V bit, TC bit
- AH air hammer
- CP cable percussive
- NMLC NMLC core
- HA Hand auger
- NDD Non-Destructive Digging

Support
- C casing
- DF drilling fluid
- N none

Water
- ▶ inflow
- ◀ outflow
- ▽ initial water level (after excavation)
- ▼ standing water level @ time/date

Grading
- Wg well graded
- Pg poorly graded
- Gg gap graded
- U uniform

Grainsize
- F fine
- M medium
- C coarse

Plasticity
- Lp low plasticity
- Mp medium plasticity
- Hp high plasticity

Weathering Terms
- Fr Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremely Weathered
- RS Residual Soil

Moisture
- D dry
- M moist
- W wet

Colour
- R red
- W white
- G grey
- P purple
- Y yellow
- Bl Black
- Br Brown
- O Orange
- G Green
- B Blue

Consistency
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable

Density
- VL very loose
- L loose
- MD med. dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. AS114

Sheet | of |

Client:	CLOSEH	Project No.	754_PERON295751
Project:	PERDAMAN	Date started:	25/1/22
Site Address:	BURRUP ROAD	Date completed:	25/1/22
Drill model:	HOLLOW STEM AUGER	Drill mounting:	Hole dia (mm): 150
Logged by:	NT	Checked by:	
GPS Co-ord:		GPS Datum:	R.L. surface (AHD):
Inclination:			

Equipment used:			
	Equipment Type (PID or other)		Equipment Serial number:
	Equipment Type (PID or other)		Equipment Serial number:

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HS	N			AS114_0 AS114_0.25 AS114_0.5 AS114_0.75		0 0.5 0.8		SANDY CLAY: BROWN. MODERATELY SORTED & MEDIUM GRAINED WITH FRAGMENTS OF GRANOPHYRE. CLAY: BROWN. CONTAINS GRANOPHYRE BITS. EOH			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.

Initial water level:	(after mins.)	Static water level:	(after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. MW03 / SS14

Sheet | of |

Client:	CLOUGH	Project No.	754-PERON295751
Project:	PERDAMAN	Date started:	26/1/22
Site Address:	BURRUP ROAD.	Date completed:	26/1/22
Drill model:	HOLOW STEM AUGER	Drill mounting:	Hole dia (mm): 150
Logged by:	NT	Checked by:	
GPS Co-ord:		GPS Datum:	R.L. surface (AHD):
Inclination:			
Equipment used:	Equipment Type (PID or other)	Equipment Serial number:	
	Equipment Type (PID or other)	Equipment Serial number:	

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HS	N	0.2 ▽		SS14-0	0	0		CLAY: BROWN, VERY SLOPPY.			LITTLE OR NO RETURNS.
				SS14-0.5	0						NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
				SS14-1.0	0						
						1.25		CLAY: PINK-BROWN. HIGH PLASTICITY.			WELL SLOTTED TO SURFACE WITH GRAVEL TO SURFACE, PLINTH PLACED AROUND PVC FOR PROTECTION FOLLOWED BY CEMENT.
				SS14-2.0	0	2.0		CALCRETE: RED-BROWN-WHITE, MOTTLED, CALCAREOUS WITH DARK GREY BANDS OF GRANOPHYRE MATERIAL.			
				2.5							
						3.0		EOH			

Initial water level: (after mins.) Static water level: (after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. AS16

Sheet 1 of 1

Client:	CLOUGH	Project No.	754-PERG125751
Project:	PERDAMAN	Date started:	26/1/22
Site Address:	BURKUP ROAD	Date completed:	26/1/22
Drill model:	HOLLOW STEM AUGER	Drill mounting:	Hole dia (mm): 150
Logged by:	NT	Checked by:	
GPS Co-ord:		GPS Datum:	R.L. surface (AHD):
Inclination:			
Equipment used:	Equipment Type (PID or other)		Equipment Serial number:
	Equipment Type (PID or other)		Equipment Serial number:

Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HS	N			AS16-0		0		CLAY: BROWN. HIGH PLASTICITY.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
				AS16-0.25							
				AS16-0.5							
				AS16-0.75							
				AS16-1.0							
				AS16-1.25		1.25		CLAY: PINK-BROWN. HIGH PLASTICITY.			
				AS16-1.5							
				AS16-1.75							
				AS16-2.0		2.0		CALCRETE: RED-BROWN-WHITE. MOTTLED, CALCAREOUS WITH DARK GREY BANDS OF GRANOPHYRE MATERIAL.			
				AS16-2.25							
				AS16-2.5							
				AS16-2.75							
				AS16-3.0		3.0		EOH.			

Initial water level: (after mins.) Static water level: (after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. AS15

Sheet 1 of 1

Client:	CLOUGH	Project No.	754_PEREN29575
Project:	PEERAMAN	Date started:	26/11/22
Site Address:	BURRUP ROAD	Date completed:	26/11/22
Drill model:	HOLLOW STEM AUGER	Drill mounting:	Hole dia (mm): 150
Logged by:	NT	Checked by:	
GPS Co-ord:		GPS Datum:	R.L. surface (AHD):
Inclination:			

Equipment used:			
	Equipment Type (PID or other)		Equipment Serial number:
	Equipment Type (PID or other)		Equipment Serial number:

Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HS	N			AS15-0		0		SANDY CLAYEY GRAVEL: ORANGE-BROWN. POORLY SORTED, SUB-ROUNDED TO SUB-ANGULAR FRAGMENTS OF CALCRETE & GRANOPHYRE.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
				AS15-0.25							
				AS15-0.5		0.5		SANDY CLAY: ORANGE. HIGH PLASTICITY. MINOR GRANOPHYRE & CALCRETE.			
				AS15-0.75							
				AS15-1.0							
				AS15-1.25							
				AS15-1.5		1.5		CALCRETE: PINK-WHITE, MOTTLED, CALCAREOUS.			
				AS15-1.75							
				AS15-2.0							
						2.1		EOH			

Initial water level:	(after mins.)	Static water level:	(after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. AS17

Sheet 1 of 1

Client:	CLOUGH	Project No.	756_PERKN295271
Project:	PERDAMAN	Date started:	26/1/22
Site Address:	BURRUP ROAD	Date completed:	26/1/22
Drill model:	GEOPROBE	Drill mounting:	Hole dia (mm): 150
Logged by:	NT	Checked by:	
GPS Co-ord:		GPS Datum:	R.L. surface (AHD):
Inclination:			
Equipment used:	Equipment Type (PID or other)		Equipment Serial number:
	Equipment Type (PID or other)		Equipment Serial number:

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
PTN				AS17-0		0		CLAYEY SAND: BROWN. MEDIUM GRAINED, PIECES OF GRANOPHYRE.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
				AS17-0.25		0.25		CALCRETE: PINKY-BROWN TO WHITE.			
				AS17-0.5				MOTTLED APPEARANCE, CALCAREOUS WITH FRAGMENTS OF GRANOPHYRE.			
				AS17-0.75							
				AS17-1.0		1.0		CALCRETISED GRANOPHYRE: GREY, WEATHERED WITH PIECES OF PINK-WHITE CALCRETE.			
				AS17-1.25							
				AS17-1.5							
				AS17-1.75							
				AS17-2.0		2.0		EOH			

Initial water level: (after mins.) Static water level: (after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. AS13

Sheet 1 of 1

Client:	CLOUGH	Project No.	754-PERGN215751
Project:	PERDAMAN	Date started:	26/1/22
Site Address:	BURRUP ROAD	Date completed:	26/1/22
Drill model:	HOLLOW STEM AUGER	Drill mounting:	Hole dia (mm): 150
Logged by:	NT	Checked by:	
GPS Co-ord:		GPS Datum:	R.L. surface (AHD):
Inclination:			
Equipment used:	Equipment Type (PID or other)	Equipment Serial number:	
	Equipment Type (PID or other)	Equipment Serial number:	

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HS	N			AS13-0m				SAND: BROWN. MEDIUM GRAINED, MODERATELY SORTED WITH FRAGMENTS OF GRANODIORITE AND SHELLS			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
				AS13_0.25m		0.3		CLAY: BROWN. HIGH PLASTICITY.			
				AS13-0.5m		0.5		CALCRETE: PALE PINK-WHITE. MOTTLED APPEARANCE.			
				AS13_0.75m		0.75		CALCRETISED GRANODIORITE: GREY. WEATHERED WITH CALCRETE INCLUSIONS.			
				AS13-1.0m		1.0m					

Initial water level: (after mins.) Static water level: (after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. AS56

Sheet 1 of 1

Client:	CLOUGH			Project No.	754_DEPEN295751
Project:	PERDAMAN			Date started:	26/1/22
Site Address:	BURRUP ROAD			Date completed:	26/1/22
Drill model:	HAND AUGER	Drill mounting:	Hole dia (mm): 150	Logged by: NT	Checked by:
GPS Co-ord:		GPS Datum:	R.L. surface (AHD):		Inclination:
Equipment used:	Equipment Type (PID or other)		Equipment Serial number:		
	Equipment Type (PID or other)		Equipment Serial number:		

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HA	N			AS6_0m		0		SANDY CLAY: BROWN, VERY SOFT AND SATURATED. FINE GRAINED.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION
				AS5_0.25m							
				AS5_0.5m							
				AS5_0.75m		0.75		CLAY: GREY-BLACK, GRANOPHYRE FRAGMENTS PRESENT			
				AS5_1.0m		1.0					

Initial water level: (after mins.) Static water level: (after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. SS12/MW07

Sheet | of |

Client:	CLOUGH					Project No.	754_PERENV295751
Project:	PERDAMAN					Date started:	26/11/22
Site Address:	KIRKUP ROAD					Date completed:	26/11/22
Drill model:	HAND AUGER	Drill mounting:		Hole dia (mm):	150	Logged by: NT	Checked by:
GPS Co-ord:		GPS Datum:		R.L. surface (AHD):			Inclination:
Equipment used:	Equipment Type (PID or other)			Equipment Serial number:			
	Equipment Type (PID or other)			Equipment Serial number:			

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HA	N	0.2 ▽		SS12-0m	0	0		SANDY CLAY: BROWN, VERY SOFT AND SATURATED. FINE GRAINED.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
				SS12-0.5m	0						
						0.75		CLAY: GREY-BLACK. GRANOHYRE FRAGMENTS PRESENT.			MONITORING WELL SLOTS SURROUNDED BY PERMEABLE SOCK. NO GRAVEL.
				SS12-1.0m	0	1.0					

Initial water level: (after mins.) Static water level: (after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. AS57

Sheet 1 of 1

Client:	CLOUGH	Project No.	754-PEREN295751
Project:	PERDAMAN	Date started:	26/1/22
Site Address:	BURRUP ROAD	Date completed:	26/1/22
Drill model:	HAND AUGER	Drill mounting:	
Hole dia (mm):	150	Logged by:	NT
Checked by:		GPS Co-ord:	
GPS Datum:		R.L. surface (AHD):	
Inclination:		Equipment used:	Equipment Type (PID or other)
Equipment Serial number:		Equipment Type (PID or other)	
Equipment Serial number:			

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HA	N			AS_0m AS_0.25m AS_0.5m AS_0.75m		0 0.5 0.75		SANDY GRAVEL: RED-BROWN, POORLY SORTED, SUB-ANGULAR TO SUB-ROUNDED GRAINS OF GRANOPHYRE, QTZ AND SHELL FRAGMENTS. CLAY: BROWN WITH FRAGMENTS OF CALCRETE.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.

Initial water level: (after mins.) Static water level: (after mins.)

Method
- DT diatube
- PT push tube
- SS solid stem flight auger
- HS hollow stem flight auger
- V, T V bit, TC bit
- AH air hammer
- CP cable percussive
- NMLC NMLC core
- HA Hand auger
- NDD Non-Destructive Digging

Support
- C casing
- DF drilling fluid
- N none

Water
- ▶ inflow
- ◀ outflow
- ▽ initial water level (after excavation)
- ▼ standing water level @ time/date

Grading
- Wg well graded
- Pg poorly graded
- Gg gap graded
- U uniform

Grainsize
- F fine
- M medium
- C coarse

Plasticity
- Lp low plasticity
- Mp medium plasticity
- Hp high plasticity

Weathering Terms
- Fr Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremely Weathered
- RS Residual Soil

Moisture
- D dry
- M moist
- W wet

Colour
- R red
- W white
- G grey
- P purple
- Y yellow
- Bl Black
- Br Brown
- O Orange
- G Green
- B Blue

Consistency
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable

Density
- VL very loose
- L loose
- MD med. dense
- D dense
- VD very dense

TETRA TECH COFFEY

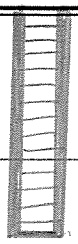
Environmental Field Log - Borehole

Borehole No. SS13/MW08

Sheet 1 of 1

Client:	CLOUGH			Project No.	754-PERGN295751
Project:	PERDAMAN			Date started:	26/1/22
Site Address:	RUKKUP ROAD			Date completed:	26/1/22
Drill model:	HAND AUGER	Drill mounting:	Hole dia (mm): 150	Logged by:	NT
Checked by:					
GPS Co-ord:		GPS Datum:	R.L. surface (AHD):	Inclination:	

Equipment used:				
	Equipment Type (PID or other)		Equipment Serial number:	
	Equipment Type (PID or other)		Equipment Serial number:	

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HAN		0.2 ▽		SS13_0m	0	0		SANDY GRAVEL: RED-BROWN, POORLY SORTED, SUB-ANGULAR TO SUB-ROUNDED GRAINS OF GRANOPHYRE, QTZ & SHELL FRAGMENTS			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
				SS13_0.5m	0	0.5		CLAY: BROWN, CONTAINS FRAGMENTS OF CALCRETE,			MONITORING WELL SLOTS SURROUNDED BY PERMEABLE SOCK, NO GRAVEL.
				SS13_0.75m		0.75					

Initial water level:	(after mins.)	Static water level:	(after mins.)

Method
- DT diatube
- PT push tube
- SS solid stem flight auger
- HS hollow stem flight auger
- V, T V bit, TC bit
- AH air hammer
- CP cable percussive
- NMLC NMLC core
- HA Hand auger
- NDD Non-Destructive Digging

Support
- C casing
- DF drilling fluid
- N none

Water
- ▶ inflow
- ◀ outflow
- ▽ initial water level (after excavation)
- ▼ standing water level @ time/date

Grading
- Wg well graded
- Pg poorly graded
- Gg gap graded
- U uniform

Grainsize
- F fine
- M medium
- C coarse

Plasticity
- Lp low plasticity
- Mp medium plasticity
- Hp high plasticity

Weathering Terms
- Fr Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremely Weathered
- RS Residual Soil

Moisture
- D dry
- M moist
- W wet

Colour
- R red
- W white
- G grey
- P purple
- Y yellow
- Bl Black
- Br Brown
- O Orange
- G Green
- B Blue

Consistency
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable

Density
- VL very loose
- L loose
- MD med. dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. ASS20

Sheet 1 of 1

Client:	CLOUGH	Project No.	75L-PERDN295751
Project:	PERDAMAN	Date started:	27/1/22
Site Address:	BURRUP ROAD	Date completed:	27/1/22

Drill model:	HOLLOW STEM AUGER	Drill mounting:		Hole dia (mm):	150	Logged by:	NT	Checked by:	
GPS Co-ord:		GPS Datum:		R.L. surface (AHD):				Inclination:	

Equipment used:	Equipment Type (PID or other)		Equipment Serial number:	
	Equipment Type (PID or other)		Equipment Serial number:	

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
HS	N			ASS20_0				SAND BROWN MODERATELY SORTED WITH MINOR SHELL FRAGMENTS.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
				ASS20_0.25		0.25		CALCRETE: RED-PINK-WHITE. MOTTLED APPEARANCE.			
				ASS20_0.5				INTERMITTENT GREY CLAY BANDS.			
				ASS20_0.75							
				ASS20_1.0							
				ASS20_1.25							
				ASS20_1.5		1.5		SANDY CLAY: BROWN, FINE GRAINED, MODERATE PLASTICITY.			
				ASS20_1.75		1.75		CALCRETISED GRANOPHYRE: GREY. INCLUSIONS OF CALCRETE.			
				ASS20_2.0		2.1					

Initial water level:	(after mins.)	Static water level:	(after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. MW10

Sheet 1 of 2

Client:	CLOUGH	Project No.	78L_PERGN295751
Project:	PERDAMAN	Date started:	27/1/22
Site Address:	BURRUP ROAD	Date completed:	27/1/22
Drill model:	AIR HAMMER	Drill mounting:	
Hole dia (mm):	150	Logged by:	NT
Checked by:		GPS Co-ord:	
GPS Datum:		R.L. surface (AHD):	
Inclination:			

Equipment used:			
Equipment Type (PID or other)		Equipment Serial number:	
Equipment Type (PID or other)		Equipment Serial number:	

Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
AH	N	0.6				0		CLAYEY GRAVEL: PINKY-BROWN. POORLY SORTED. SUB-ANGULAR TO SUB-ROUNDED FRAGMENTS OF GRANOPHYRE & MINOR CALCRETE IN A CLAY MATRIX.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
						1.0		CALCRETISED GRANOPHYRE: GREY. MINOR CALCRETE AND CLAY. WEATHERING EVIDENT.			INCREASE IN WATER FLOW.
				EOH		2.0		GRANOPHYRE: GREY, WEATHERED, FRACTURING EVIDENT. X-STALLINE TEXTURE.			SMALL FRACTURES EVIDENT.
			FALLBACK			3.0					

Initial water level: (after mins.) Static water level: (after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. MW10

Sheet 2 of 2

Client:	CLOUGH	Project No.	754_PERFEN295751
Project:	PERDAMAN	Date started:	27/1/22
Site Address:	BURNUP ROAD	Date completed:	27/1/22
Drill model:	AIR HAMMER.	Drill mounting:	Hole dia (mm): 150
Logged by:	NT	Checked by:	
GPS Co-ord:		GPS Datum:	R.L. surface (AHD):
Inclination:			
Equipment used:	Equipment Type (PID or other)	Equipment Serial number:	
	Equipment Type (PID or other)	Equipment Serial number:	

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
AH	N		FALL BACK			3.5	X X X X X X				
						4.5		EOH			

Initial water level:	(after mins.)	Static water level:	(after mins.)

Method
DT diatube
PT push tube
SS solid stem flight auger
HS hollow stem flight auger
V, T V bit, TC bit
AH air hammer
CP cable percussive
NMLC NMLC core
HA Hand auger
NDD Non-Destructive Digging

Support
C casing
DF drilling fluid
N none

Water
▶ inflow
◀ outflow
▽ initial water level (after excavation)
▼ standing water level @ time/date

Grading
Wg well graded
Pg poorly graded
Gg gap graded
U uniform

Grainsize
F fine
M medium
C coarse

Plasticity
Lp low plasticity
Mp medium plasticity
Hp high plasticity

Weathering Terms
Fr Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered
RS Residual Soil

Moisture
D dry
M moist
W wet

Colour
R red
W white
G grey
P purple
Y yellow
Bl Black
Br Brown
O Orange
G Green
B Blue

Consistency
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable

Density
VL very loose
L loose
MD med. dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Field Log - Borehole

Borehole No. AS19

Sheet 1 of 1

Client:	CLOUGH	Project No.	FKLPERGN215751
Project:	PERDAMAN	Date started:	27/1/22
Site Address:	BURRUP ROAD	Date completed:	27/1/22
Drill model:	GEOPROBE	Drill mounting:	Hole dia (mm): 150
Logged by:	NT	Checked by:	
GPS Co-ord:		GPS Datum:	R.L. surface (AHD):
Inclination:			
Equipment used:	Equipment Type (PID or other)	Equipment Serial number:	
	Equipment Type (PID or other)	Equipment Serial number:	

Drilling information							Material substance				Additional observations
Method	Support	Water	construction details	sample ID / type / tests	PID (ppm)	depth (m)	USCS	MATERIAL DESCRIPTION (secondary) PRIMARY soil name, primary component characteristics, colour, secondary component characteristics, minor components	moisture condition	consist. / density	Comments (including Evidence of Contamination, Structure, Geological Unit & Additional Observations)
PT	N			AS19_0	0	0		SANDY CLAY: PINKY-BROWN, FINE GRAINED.			NO VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION.
				AS19_0.35							
				AS19_0.5	0						
						0.6					

Initial water level: (after mins.) Static water level: (after mins.)

Method
- DT diatube
- PT push tube
- SS solid stem flight auger
- HS hollow stem flight auger
- V, T V bit, TC bit
- AH air hammer
- CP cable percussive
- NMLC NMLC core
- HA Hand auger
- NDD Non-Destructive Digging

Support
- C casing
- DF drilling fluid
- N none

Water
- ▶ inflow
- ◀ outflow
- ▽ initial water level (after excavation)
- ▼ standing water level @ time/date

Grading
- Wg well graded
- Pg poorly graded
- Gg gap graded
- U uniform

Grainsize
- F fine
- M medium
- C coarse

Plasticity
- Lp low plasticity
- Mp medium plasticity
- Hp high plasticity

Weathering Terms
- Fr Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremely Weathered
- RS Residual Soil

Moisture
- D dry
- M moist
- W wet

Colour
- R red
- W white
- G grey
- P purple
- Y yellow
- Bl Black
- Br Brown
- O Orange
- G Green
- B Blue

Consistency
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable

Density
- VL very loose
- L loose
- MD med. dense
- D dense
- VD very dense

APPENDIX H: SUPPLEMENTARY BORE LOGS

DRAFT

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Engineering Log - Excavation

Excavation ID. - TP15
sheet: 1 of 1
project no. 754-PERGE271567
date excavated: 11/8/20
date completed: 11/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
equipment type: CASE 13T
surface elevation: Not Specified
excavation method: 435 mm bucket tooth
pit orientation: -90
excavation dimensions: ±1x2m

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
Ex			N/A			0.1			TOP SOIL, dk red/brown, grass roots /	D			spinifex + cobbles surface
						0.5			clayey gravel, dk red brown, f to c grained, low plasticity with Granophyre cobble/boulder, green grey, moderately weathered.	M	D		
						1.0			granophyre boulders/cobbles, blue/grey with clayey gravel. fc grained				moderately to slightly weathered
						1.3			Refusal @ 1.3m Hard digging				
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - TP40
sheet: 1 of 1
project no. 754 - PERGE271567
date excavated: 11/8/20
date completed: 11/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
equipment type: Case 13T
surface elevation: Not Specified teeth
excavation method: bucket 435mm
pit orientation: -90°
excavation dimensions: 1x2m

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EX	N		N/A			0.1			Topsoil, dk red/brown, grass roots	D			spinifex + granophyre cobbles on surface, shrubs nearby and surrounds
				MMDD/ CBR 0.5-1.0 PSD/ AL/ MC		0.5			Clayey Gravel, dk red/brown, w/ granophyre cobbles, fc grained. blue/grey, moderately to slightly weathered.	M	D		
						1.0			granophyre boulders/cobbles, blue grey, fc grained, MW to SW, w/ clayey gravels, fc grained.				
						1.5			Refusal @ 1.35m depth				
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - TP53
sheet: 1 of 1
project no. PER66271562
date excavated: 11/8/20
date completed: 11/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
equipment type: CASE 130
surface elevation: Not Specified
excavation method: 435 tooth bucket
pit orientation: -90
excavation dimensions: 1 x 2.5m

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EXN			W/A						Top soil, grass roots, brown red fine grained.				Alluvium near creeks.
								0-2	clayey sandy GRAVEL, f c grained, red/brown, low plasticity, sand is fc grained	D-M	D		
			PSD AL MC	1.3 - 1.5		0.5, 1.0							
						1.5, 2.0			granophyre boulder/cobbles, argillite, moderately weathered to slightly weathered w/ clayey gravel, fc grained.	M	D - VD		
						2.5			Terminated @ 2.35m Hard digging Refusal				
						3.0, 3.5							

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method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator

support
N none
S shoring

penetration
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
U## undisturbed sample ##mm diameter
D disturbed sample
B bulk disturbed sample
E environmental sample
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane sheapeak/remouded (uncorrected kPa)
R refusal

classification symbol & soil description based on Unified Classification System

moisture
D dry
M moist
W wet
W_P plastic limit
W_L liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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Engineering Log - Excavation

Excavation ID. - TP-16
sheet: 1 of 1
project no. PERGE 27567
date excavated: 11/8/20
date completed: 11/8/20
logged by: CJ
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
equipment type: CASE CX130B
surface elevation: Not Specified
excavation method: 435 mm bucket bucket
pit orientation: -90
excavation dimensions: 1×2m

excavation information							material substance							
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EXN			N/A						TOPSOIL, grass roots	D			Shrubs + spinifex on surface
						0.5			Clayey gravel, dk brown, fc gravel, low plasticity, with granophyre boulders/cobbles,	M	D-VD		North side of creek.
						1.0			granophyre boulder/cobbles, sw-gmw, fc gravel, blue/grey, w/clayey gravel, fc gravel, Clay is low plasticity				
						1.5			Refusal @1.5m hard digging				
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - TP 12
sheet: 1 of 1
project no. PERGE-[illegible]567
date excavated: 11/8/20
date completed: 11/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
equipment type: CASE EX 130
surface elevation: Not Specified
excavation method: 435 tooth bucket
pit orientation: -90
excavation dimensions: 10 2m

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EN			NA			0.2			TOPSOIL, dk red brown, grass roots,	D			grass ~~on surface~~
						0.5			clayey GRAVEL, dk red brown, f-c gravel, lw plasticity w/ granophyre cobbles/boulders, moderately weathered, f-c gravel. blue/grey/red @0.8m	M	D to VD		f granophyre outcrops / floats on surface
						1.0							
						1.5			Some dolerite, trace of quartz cobbles		VD		
						2.0			Refusal @ 1.1m @ dolerite bed (?)				
						2.5							
						3.0							
						3.5							

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method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator

support
N none
S shoring

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
U## undisturbed sample ##mm diameter
D disturbed sample
B bulk disturbed sample
E environmental sample
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear peak/remouded (uncorrected kPa)
R refusal

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
W_P plastic limit
W_L liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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Engineering Log - Excavation

Excavation ID. - TP-09
sheet: 1 of 1
project no. PERGEZ241567
date excavated: 11/8/20
date completed: 11/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
equipment type: CASE 130EX
surface elevation: Not Specified
excavation method: 435 mm tooth bucket
pit orientation: ~90
excavation dimensions: 1 x 2m

excavation information							material substance							
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
E	N		NA						TOPSOIL, dk red brown, grass roots,	D			on top of hill, spinifex and outcrops surrounds
						0.5			granophyre, fc gravel, blue/grey, w/ clayey gravel, dk red brown, fc gravel, low plasticity.	M	D – VD		
						1.0							
						1.5			Refusal @1.3m depth				
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- 1 2 3
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID.	- TP17
sheet:	1 of 1
project no.	PERGE[illegible]/567
date excavated:	1/8/20
date completed:	1/8/20
logged by:	CS
checked by:	

client: *Clough*

principal:

project: *Perdaman Urea*

location: *Dampier*

position: Not Specified
equipment type: EASE BOEX
surface elevation: Not Specified
excavation method: 435 tooth bucket
pit orientation: -90
excavation dimensions: 1x2m

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EN			NA			0.2			TOP SOIL, dk red brown, grass roots	D	D		
						0.5	GC		clayey GRAVEL, dk red brown, fc grained, low plasticity, w/ granophyre boulders/ cobbles, fm grained.	M	VD		
						1.0			granophyre boulders/ cobbles, grey/blue, sw to mw, fc grained w/ clayey gravel, fc grained, low plasticity, dk red brown	M	VD		
						1.5			Refusal @1.4m hard digging				
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - TP42
sheet: 1 of 1
project no. PER6E271567
date excavated: 12/8/20
date completed: 12/8/20
logged by: CJ
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
equipment type: CASE 9/130
surface elevation: Not Specified
excavation method: 435 mm hole
pit orientation: -90
excavation dimensions: 1×2 m

excavation information: method	support	penetration	water	samples & field tests	RL (m)	depth (m)	material substance: graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EN			N/A					0.1	TOPSOIL, Grassroots, dk red brown	D			adjacent to a ± 5m wide creek (dry).
						0.5			clayey GRAVEL, fc grand, dk red/brown, low plasticity w/ granophyre cobbles, moderately weathered,	M	D V D		
				1.0-1.2 PSD/AL/MC		1.0							
						1.5			becoming red brown, more clay, less gravel, low plasticity, fc grand,				
				2.0-2.8 MMOD/CBR/PSD/AL/MC		2.0							
						2.5							
						3.0			Target depth @ 3m achieved				
						3.5							

method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator

support
N none
S shoring

penetration
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
U## undisturbed sample ##mm diameter
D disturbed sample
B bulk disturbed sample
E environmental sample
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane sheapeak/remouded (uncorrected kPa)
R refusal

classification symbol & soil description based on Unified Classification System

moisture
D dry
M moist
W wet
W_P plastic limit
W_L liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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Engineering Log - Excavation

Excavation ID.	- TP02
sheet:	1 of 1
project no.	PERGE 271567
date excavated:	12/8/20
date completed:	12/8/20
logged by:	CS
checked by:	

client: *Clough*

principal:

project: *Perdaman Urea*

location: *Dampier*

position: Not Specified
surface elevation: Not Specified
pit orientation: -90
equipment type: CASE EX130
excavation method: 435 mm tooth bucket
excavation dimensions: 1 x 2m

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EN			N/A			0.1			TOPSOIL, grass roots, odd brown	D			Moved ±2-3m north because location is on track
				0.3-0.5 PSD/AL/MC		0.5			Clayey GRAVEL, dured/brown, fc gravel, low plasticity, w/ Granophyre Cobbles, blue/grey, MW, fc gravel.	M	D-VD		E476352 #13 N 7718932
						1.0							
						1.5			Refusal @ 1.1m on Granophyre Boulders.				
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

client:	Clough	Excavation ID.	TP19
principal:		sheet:	1 of 1
project:	Perdaman Urea	project no.	PQR6E271567
location:	Dampier	date excavated:	12/8/20
		date completed:	12/8/20
		logged by:	CS
		checked by:	

position: Not Specified | surface elevation: Not Specified | pit orientation: -90
equipment type: CASE EX 30 | excavation method: 43Tm [illegible] | excavation dimensions: 1~2m

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EN			NA			0.1			TOP SOIL, grass roots, dk redbrown	D			
						0.5			Clayey GRAVEL, dk redbrown, fc gravel, low plasticity, w/ granophyre boulder/ cobbles, SW to MW blue/grey, fc gravel				
				0.8-0.9 PSD/ AL/ MC		1.0							
									Refusal @0.9m				
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID.	- TP34
sheet:	1 of 1
project no.	PER6E271567
date excavated:	12/8/20
date completed:	12/8/20
logged by:	CJ
checked by:	

client: *Clough*

principal:

project: *Perdaman Urea*

location: *Dampier*

position: Not Specified | surface elevation: Not Specified | pit orientation: ~90

equipment type: EH30 CASE | excavation method: 43T [illegible] | excavation dimensions: 1x2

method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
EN			NA						TOPSOIL, grassroots, dk red brn	D			Spinifex and boulders surface
						0.5			Granophyre boulders, red weathering blue/grey, SW, fc gravel, white clayey GRAVEL, dk red brown, fc gravel, low plasticity.				
				1.4 1.5		1.0							
						1.5			Refusal @1.5m				
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - TP 20
sheet: 1 of 1
project no. PERGE371 567
date excavated: 12/8/20
date completed: 12/8/20
logged by: CJ
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
surface elevation: Not Specified
pit orientation: ~90
equipment type: CASE130 EX
excavation method: 435 mm bucket
excavation dimensions: 1x2

excavation information							material substance							
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
EN			W/A			0-1			TOPSOIL, dark brown, roots / branches.	D			
						0.5			silty SAND, f grained w/ granophyre cobbles	M	D		
						0-7					VD		
				1.5-3m PSD/ AL/ MC		1.0			Clayey GRAVEL, dk red/brown fc grained, low to med. plasticity, w/ granophyre cobbles, blue/grey, fc grained MW.		D		
						1.5			become more clayey low to med. plasticity, fc grained: red/brown		D		
						2.0							
						2.5							
						3.0			Target depth @ 3m achieved.				
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - T8 26
sheet: 1 of 1
project no. PER66[illegible]1567
date excavated: 12/8/20
date completed: 12/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
surface elevation: Not Specified
pit orientation: -90
equipment type: CASE 130 EX
excavation method: YST - [illegible]
excavation dimensions: 1 x 2

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EN			N/A			0.1			TOPSOIL, grass roots, dk red brown	D			Spinifex and flowers are on surface
						0.5			Clayey [illegible], dk red brown/ fc grained, clay, sh plasticity w/ granophyre, grey with red weathering, SW to MW, fc grained	M	D-VD		
						1.0							
						1.5			Refusal @ 0.65 m				
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_F plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - TP52
sheet: 1 of 1
project no. PERGE271567
date excavated: 12/8/20
date completed: 12/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
equipment type: CASE130EX
surface elevation: Not Specified
excavation method: 435 tooth bucket
pit orientation: -90
excavation dimensions: 1x2m

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EN			N/A			0.1			TOPSOIL, dk redbrown, grass roots	D			Hills on north side of TP52
						0.5			Clayey GRAVEL, redbrown fc ground, rounded to subangular, with granophyre cobbles. grey with red weathering MW to HW	M	D - V D		plenty of rock screes Grass and flowers on surface.
				1.0-1.1 PSD/ AL/ ME		1.0							
						1.5			Refusal @ 1.5m				
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - TP28
sheet: 1 of 1
project no. PERGE 271567
date excavated: 12/8/20
date completed: 12/8/20
logged by: CJ
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
surface elevation: Not Specified
pit orientation: -90
equipment type: CASE 130 EX
excavation method: 435 tooth bucket
excavation dimensions: 1x2

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
E	N		N/A						Topsoil, cross roots, dried brown	D			Shrubs, grass, flower surrounding, ± 80-100m to the north there are slopes scree rock outcrops
				0.8-1.0 PSD/AL/MC		0.5, 1.0, 1.5			Clayey GRAVEL, fe grained, subangular, dk red/brown, low plasticity. with granophyre boulders/cobbles, grey, MW, fc grained	M	D-VD		
									Refusal @ 1.6m				

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID.	- TP27
sheet:	1 of 1
project no.	PERGE[illegible]1567
date excavated:	12/8/20
date completed:	12/8/20
logged by:	CS
checked by:	

client: *Clough*

principal:

project: *Perdaman Urea*

location: *Dampier*

position: Not Specified | surface elevation: Not Specified | pit orientation: ~90

equipment type: CASE 130EX | excavation method: 435 Tooth bucket | excavation dimensions: 1.0 x 2.0

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EN			NM			0.0			Topsoil, grassmatts, dk red/brown	D	-		Spinifex grass on surface
						0.5			clayey GRAVEL, dk red brown, fc grained, subangular, low plasticity, w/ aranophyte boulders/cobbles, MW, fc grained, grey w/ red weathering	N	D / VD		
						1.0							
						1.2							
						1.5			Refusal @ 1.2m				
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - TP21
sheet: 1 of 1
project no. PERGE2[illegible]1567
date excavated: 12/8/20
date completed: 12/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
surface elevation: Not Specified
pit orientation: -50
equipment type: CASE EX130
excavation method: 435 tooth bucket
excavation dimensions: 1X2m

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
									TOP SOIL, grassroots, dried brown	D			
				0.5-0.8 MMD/CBR/PSD/AL/MC		0.5			Clayey GRAVEL, fc grained dried brown, angular/subangular, low plasticity.	M	D-VD		
						1.0							
						1.5							
						2.0			Terminated @ 2.0m Slow digging				
						2.5							
						3.0							
						3.5							

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - TP22
sheet: 1 of 1
project no. PER6E251367
date excavated: 12/8/20
date completed: 12/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
surface elevation: Not Specified
pit orientation: -90
equipment type: CASE IPOEC
excavation method: 2T35 tooth bucket
excavation dimensions: 1x2m

excavation information							material substance						
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
EN			NW			0.1			TOPSOIL, Grass roots, dk red brown				
						0.5			Clayey GRAVEL fe grained, dk red brown, clay is low plasticity. with Granophyre boulders/cobbles, grey, MW				
				0.9 - 1.1 PSM/ AL/ MC		1.0							
						1.5			Refusal @1.0m				
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance
- ranging to
- refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - TP06
sheet: 1 of 1
project no. PERGE271567
date excavated: 12/8/20
date completed: 12/8/20
logged by: CJ
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
equipment type: EX130 CASE
surface elevation: Not Specified
excavation method: 4 3T mustrate bucket
pit orientation: -90
excavation dimensions: 7x2 m

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EN			PA						TOPSOIL, grass roots, dry red brown				
						0.5			~~Clayey~~ Ironstone Boulders/ Cobbles, SW, blue/grey fc grained, w/ clayey GRAVEL, fc grained, dk red brown, Clay, slow plasticity	M	VD		
						1.0							
						1.5							
						2.0			Refusal Collapse				
						2.5							
						3.0							
						3.5							

method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator

support
N none
S shoring

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
U## undisturbed sample ##mm diameter
D disturbed sample
B bulk disturbed sample
E environmental sample
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane sheapeak/remouded (uncorrected kPa)
R refusal

classification symbol & soil description based on Unified Classification System

moisture
D dry
M moist
W wet
W_P plastic limit
W_L liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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Engineering Log - Excavation

Excavation ID. - TP-35
sheet: 1 of 1
project no. PERGE
date excavated: 12/8/20
date completed: 12/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
equipment type: CASE 130 EX
surface elevation: Not Specified
excavation method: 435 tooth bucket
pit orientation: -90
excavation dimensions: 1x 2m

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EN								GC/CH	Sandy Gravelly CLAY / Gravelly sandy CLAY, low to med to high plasticity, fc grained, brown / light brown,	M	D – V D		Granophyre cobbles and tidal flat lands - on surface
				0.9 t.t PSD/ AL/ (Shrink Swell). MC		0.5 1.0 1.5 2.0			Some granophyre cobbles @1.9 water seepage from wall	M – W W			
						2.5 3.0 3.5			Terminated @ 2.2m				

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method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator

support
N none
S shoring

penetration
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
U## undisturbed sample ##mm diameter
D disturbed sample
B bulk disturbed sample
E environmental sample
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane sheapeak/remouded (uncorrected kPa)
R refusal

classification symbol & soil description based on Unified Classification System

moisture
D dry
M moist
W wet
W_P plastic limit
W_L liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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Engineering Log - Excavation

Excavation ID.	- 7P38
sheet:	1 of 1
project no.	PERGEL 271562
date excavated:	12/8/20
date completed:	12/8/20
logged by:	CJ
checked by:	

client: *Clough*

principal:

project: *Perdaman Urea*

location: *Dampier*

position: Not Specified | surface elevation: Not Specified | pit orientation: -90

equipment type: BOLASE EY | excavation method: 435 mm tooth/mm | excavation dimensions: 1x2m

excavation information							material substance						
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
				~~0.25~~ ~~0.25~~ 0.5 0.75 ↓ 3x ASS		0.5 1.0 1.5 2.0 2.5 3.0 3.5			Granophyre boulder/ cobbles, SW, blue/grey, fc grained w/clayey gravel.	D M	V D		3x ASS samples
									Refusal @ 0.8m on boulders				on "mini" hill surface

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

coffey
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Engineering Log - Excavation

Excavation ID.	- TP 54
sheet:	1 of 1
project no.	PERGE 271517
date excavated:	12/8/20
date completed:	12/8/20
logged by:	CP
checked by:	

client: *Clough*

principal:

project: *Perdaman Urea*

location: *Dampier*

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: | excavation method: | excavation dimensions:

excavation information							material substance						
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
CW			NA						Clayey GRAVEL / Boulders Calcrete(?) red/grey, MW,	M	VD H		
						0.5							
						1.0			Refusal @ 0.5 m				
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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7 + 17 + 11 + 6
✓ ✓ 8 1
3
NW

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Engineering Log - Excavation

Excavation ID. - TP39
sheet: 1 of 1
project no. PERGE 271567
date excavated: 12/8/20
date completed: 12/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
equipment type:
surface elevation: Not Specified
excavation method: 435 tooth bucket
pit orientation: -90
excavation dimensions: 1x2m

excavation information							material substance						
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
EN								CL	Sandy gravelly clay, low to high plasticity, gravel is fc ground red / grey	M - W	S to F to St		
						0.5							
			1.3m			1.0			water seepage @ 1.3m				
				1.7 - 1.5									
				PSD/ AL/ MC		1.5			Terminate @ 1.5 m TP hole start to collapse				
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID.	- TP 18
sheet:	1 of 1
project no.	PERGE 2[illegible]1567
date excavated:	12/8/20
date completed:	12/8/20
logged by:	CS
checked by:	

client: *Clough*

principal:

project: *Perdaman Urea*

location: *Dampier*

position: Not Specified | surface elevation: Not Specified | pit orientation: -90

equipment type: 130 Ex Case | excavation method: 435 mm tooth bucket | excavation dimensions: 1x2m

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EN			1	~~ASS~~ ASS		0.5			SAND, brown, fm grained	D-M	MD		Sand, shell fragments on surface
				~~ASS~~ ~~ASS~~ ΔXASS @0.25 0.5 0.75 1.0		1.0			@0.8m becoming clayey SAND / sandy clay, low to med plasticity, fm grained, brown / grey with some granophyre cobbles, grey, mw. fc grained				
			1.8	1.6-1.8m PSD/AL/MC		1.5							@1.8m water seepage
						2.0			Refusal @ 1.9m				
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - TP 11
sheet: 1 of 1
project no. PERGE271567
date excavated: 13/8/20
date completed: 13/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
surface elevation: Not Specified
pit orientation: -90
equipment type: EX 180 CASE
excavation method: 435
excavation dimensions: 1X2m

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EN			Nd			0.1			TOPSOIL. grass roots, dried brown	D			~~[illegible]~~
				PSD AL MC	0.5 / 1.0	0.5		GC	Clay GRAVEL, fe grain, dried brown, clay, s low plasticity, w/ granophyre cobbles, MW, dry grey	D-M	D-VD		
						1.0			Refusal @ 1.0m				
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - TP43
sheet: 1 of 1
project no. PERGE 271567
date excavated: 13/8/20
date completed: 13/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
equipment type: CASE 130EX
surface elevation: Not Specified
excavation method: 435 mm tooth bucket
pit orientation: -90
excavation dimensions: 1x2m

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
E	N		NA				0.1 m		TOPSOIL, grass roots, dk brown	D	-		Spinifex grass on surface
				0.8 1.0 MMDD CBR		0.5, 1.0, 1.5, 2.0, 2.5			Clayey GRAVEL, dark brown, fe grained, low plastic w/ granophyre cobbles grey, MW, fe grain	M	D - V D		
						3.0, 3.5			Terminated @ 2.7m slow digging				

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Site amendment - heritage recommendation to move down the hill approved onsite - walked over w/ heritage monitors location agreed by monitor

Engineering Log - Excavation

Excavation ID. - TP14
sheet: 1 of 1
project no. PERGE 271562
date excavated: 13/8/20
date completed: 13/8/20
logged by: CG
checked by:

client: Clough
principal:
project: Perdaman Urea
location: Dampier

position: Not Specified
equipment type: EX 130 CASE
surface elevation: Not Specified
excavation method: 435mm bucket
pit orientation: -90
excavation dimensions: 1x2m

excavation information							material substance						
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
EX			NA			0.1			TOPSOIL, dk red brown, grass roots	D			
						0.5			Clayey GRAVEL, fc gravel, low plasticity, dk red brown, w/ granophyre cobbles, MW to SW, grey, fc gravel	M	VD		calcrete/ duricrust observed nearby
						1.0			Refusal @ 0.7m				
						1.5							New E 475952 N 7719349
						2.0							
						2.5							
						3.0							
						3.5							

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method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator

support
N none
S shoring

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
U## undisturbed sample ##mm diameter
D disturbed sample
B bulk disturbed sample
E environmental sample
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane sheapeak/remouded (uncorrected kPa)
R refusal

classification symbol & soil description based on Unified Classification System

moisture
D dry
M moist
W wet
W_P plastic limit
W_L liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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Engineering Log - Excavation

Excavation ID. - TP 25
sheet: 1 of 1
project no. PERGE 271567
date excavated: 13/8/20
date completed: 13/8/20
logged by: CJ
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
surface elevation: Not Specified
pit orientation: -90
equipment type: CASE 130 EX
excavation method: 435 mm tooth
excavation dimensions: 1x2m

excavation information							material substance						
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
E	N		N/A						Clayey GRAVEL, fcground, red brown/grey, low to med plasticity, w/ granophyre cobbles MW, grey, fcground	M - W	VD		
						0.5							
						1.0			Refusal @ 0-8m				
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

A88
X1.07

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Engineering Log - Excavation

Excavation ID. - TP29
sheet: 1 of 1
project no.
date excavated: 13/8/20
date completed: 13/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
equipment type:
surface elevation: Not Specified
excavation method:
pit orientation:
excavation dimensions:

excavation information							material substance						
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
BN			1.4m			0.5 1.0 1.5 2.0 2.5 3.0 3.5			Clayey GRAVEL, red brown grey fe gravel, low to med plastic TP 1.6m test pit wall collapsing and water seepage	W	MD D		test pit wall collapsing 1.4 water seepage

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TP 23

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Engineering Log - Excavation

Excavation ID. - TP23
sheet: 1 of 1
project no.
date excavated: 13/8/20
date completed: 13/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
surface elevation: Not Specified
pit orientation: ~10
equipment type:
excavation method:
excavation dimensions: 10m

excavation information							material substance						
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
EN			W						Clayey gravel red brown, fe gravel, low to med plastic,	M W	MD D		
						0.5							
						1.0							
				1.5/1.6m		1.5							1.5/1.6 water seepage
						2.0		TP	2.0 m terminal testing wall collapsing				
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID.	- TP04
sheet:	1 of 1
project no.	PERGE 271567
date excavated:	13/8/20
date completed:	13/8/20
logged by:	CS
checked by:	

client: *Clough*

principal:

project: *Perdaman Urea*

location: *Dampier*

position: Not Specified | surface elevation: Not Specified | pit orientation: -90

equipment type: CASE 30EX | excavation method: 430 rock tube | excavation dimensions: 1x2

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
E	N		NA	2x medium 0.7-0.85m to be combined mmDD/CBR		0.5			Clay gravel, brown, fc grained, low plasticity. w/ grain/pipe cobbles/boulders. grey, mw	D M W			
						1.0			Refusal @ 0.85m				
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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ASS
X1.5m

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moved to BH 19 position due to excavator access

Engineering Log - Excavation

coordinates please use BH19

Excavation ID.	- TP 03
sheet:	1 of 1
project no.	DERGE271567
date excavated:	13/8/20
date completed:	13/8/20
logged by:	CS
checked by:	

client: *Clough*

principal:

project: *Perdaman Urea*

location: *Dampier*

position: Not Specified | surface elevation: Not Specified | pit orientation: -90

equipment type: | excavation method: | excavation dimensions: 1x2m

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EN				ASS XS 0.25 0.5 0.75 1.00 1.25		0.5 1.0 1.5 2.0 2.5 3.0 3.5		GC	Clayey GRAVEL, fc grained, red/grey, low to med. plas, w/ granophyre Gobbles MW, grey w/red weathering	M W W	D VD		@1.0m water seepage
									TP 03 terminated @ 1.3m test pit wall collapsing.				

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

coffey
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Engineering Log - Excavation

Excavation ID.	- TP07
sheet:	1 of 1
project no.	PERGE271567
date excavated:	13/8/20
date completed:	13/8/20
logged by:	CJ
checked by:	

client: *Clough*

principal:

project: *Perdaman Urea*

location: *Dampier*

position: Not Specified | surface elevation: Not Specified | pit orientation: -90

equipment type: | excavation method: | excavation dimensions: 1x2m

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EN			N/A						clayey GRAVEL, ~~Gravelly CLAY, w/gr~~ brown w plag, fc grained. W/ granophyre cobbles, SW-MW, grey	M	VD		
						0.5							
						1.0							
			▽										water seepage @ 1.4m
						1.5			TP terminated @ 1.4m				
						2.0							
						2.5							
						3.0							
						3.5							

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - TP 55
sheet: 1 of 1
project no. PER6E271567

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

date excavated: 13/8/20
date completed: 13/8/20
logged by: CJ
checked by:

position: Not Specified
equipment type:
surface elevation: Not Specified
excavation method:
pit orientation:
excavation dimensions:

excavation information							material substance						
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
EN						0.1			TOPSOIL, dk brown, grass root				
						0.5			Silty SAND/SAND, brown, fine grained, gravelly,	M	D		
						1.0							
						1.5							
						2.0							water at bottom of pit.
				▶ 2.2m					TP terminated @ 2.2m on boulder				
						2.5							
						3.0							
						3.5							

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method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator

support
N none
S shoring

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
U## undisturbed sample ##mm diameter
D disturbed sample
B bulk disturbed sample
E environmental sample
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane sheapeak/remouded (uncorrected kPa)
R refusal

classification symbol & soil description based on Unified Classification System

moisture
D dry
M moist
W wet
W_P plastic limit
W_L liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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Engineering Log - Excavation

Excavation ID. - TP36
sheet: 1 of 1
project no. PERGE271567
date excavated: 14/8/20
date completed: 14/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
surface elevation: Not Specified
pit orientation: -90
equipment type: CASE 130EX
excavation method: 300mm toothless
excavation dimensions: 1 x 2m

excavation information							material substance						
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
EX			N/A						Clayey GRAVEL, brown, fine grained, low plasticity, w/ boulders / cobbles, white, MW.	D	D		Spinifex and shrubs on surface
						0.5							
				1.0-1.1 m PSD/ ALY/ MC		1.0			@1.0m ± 600mm boulder was encountered.				
						1.5			becoming less boulders/ cobbles				
						2.0							
						2.5							
						3.0			Target depth @ 3.0 m achieved.				
						3.5							

method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator

support
N none
S shoring

penetration
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
U## undisturbed sample ##mm diameter
D disturbed sample
B bulk disturbed sample
E environmental sample
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear peak/remoulded (uncorrected kPa)
R refusal

classification symbol & soil description based on Unified Classification System

moisture
D dry
M moist
W wet
W_P plastic limit
W_L liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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Engineering Log - Excavation

Excavation ID.	TP 44
sheet:	1 of 1
project no.	PERGE27567
date excavated:	14/8/20
date completed:	14/8/20
logged by:	CS
checked by:	

client: *Clough*

principal:

project: *Perdaman Urea*

location: *Dampier*

position: Not Specified
equipment type: CASE 130 EX
surface elevation: Not Specified
excavation method: 300 mm tooth bucket
pit orientation: -90
excavation dimensions: 1x2m

excavation information							material substance							
method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
EN			NA						Sandy clayey GRAVEL, brown, light brown fe stained, low plasticity, with cobbles (?) white / MW, fe stained	M	D – V D		Shrubs, grasses on surface
						0.5							
						1.0							
						1.5							
						2.0			Terminated @ 2.0m due to slow digging				
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID.	- TP48
sheet:	1 of 1
project no.	
date excavated:	14/8/20
date completed:	14/8/20
logged by:	CS
checked by:	

client: *Clough*

principal:

project: *Perdaman Urea*

location: *Dampier*

position: Not Specified | surface elevation: Not Specified | pit orientation: 90

equipment type: | excavation method: | excavation dimensions: 1x2m

excavation information							material substance							
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
EN			NA						Clayey GRAVEL, fc drained, dk red brown, low plasticity c/w granophyre boulders cobbles	M	D / V D		
						0.5							
						1.0							
									TP terminated @1.1m refusal on boulders				
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

A88
X4

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Engineering Log - Excavation

Excavation ID. - TP 50
sheet: 1 of 1
project no.
date excavated: 14/8/20
date completed: 14/8/20
logged by: CJ
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
surface elevation: Not Specified
pit orientation: ~90
equipment type:
excavation method:
excavation dimensions: 1.5m

method	support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
E	N		NA	0-25 MCS		0.1			TOPSOIL, dured brown grass roots	D			
				0.5 AES		0.5			Clayey GRAVEL, fc gravel, dured brown, low plasticity w/ granophyre weathered calcrete boulders/ ?, MW	M	D / VD		
						1.0			Refusal @0.7m				
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

ASS
TP58

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Engineering Log - Excavation

Excavation ID.	- TP58
sheet:	1 of 1
project no.	
date excavated:	14/8/20
date completed:	14/8/20
logged by:	CS
checked by:	

moved from SOIL

client: *Clough*

principal:

project: *Perdaman Urea*

location: *Dampier*

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: | excavation method: | excavation dimensions:

excavation information							material substance							
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
				ASS					Clayey GRAVEL, fc graired, low plasticity, red brown,	M	V		E 476702
				ASS		0.5				–	D		N 7718568
				ASS						W			
				ASS									
						1.0			becoming red brown/grey				
				1.6m		1.5							
						2.0							
						2.5			TP terminated @2.1m water ~~comes~~ comes in from bottom of pit, test pit wall collapsing				
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - TP 49
sheet: 1 of 1
project no.

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

date excavated: 14/8/20
date completed: 14/8/20
logged by: CJ
checked by:

position: Not Specified
equipment type:
surface elevation: Not Specified
excavation method: 300 mm
pit orientation: ~90
excavation dimensions: 1x2m

excavation information							material substance						
method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
EN			N/A			0.5 1.0			Clayey GRAVEL, dried brown / fc grained. w/ granophyre boulders / cobbles, MW, grey	M	D – VD		
						1.5 2.0 2.5 3.0 3.5			Terminated @ 1.2m boulders				

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

client:	Clough	Excavation ID.	- TP47
principal:		sheet:	1 of 1
project:	Perdaman Urea	project no.	
location:	Dampier	date excavated:	14/8/20
		date completed:	14/8/20
		logged by:	CS
		checked by:	

position: Not Specified | surface elevation: Not Specified | pit orientation: -90
equipment type: BOLASTEX | excavation method: 300mm | excavation dimensions: 1x2m

excavation information							material substance						
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
E	N		NA			0.5			clayey GRAVEL, ll red brn fc grained, low plasticity, w/ granophyre boulders / cobbles	M - D	D		± 200 mm FILL on surface, shell fragments were observed
						1.0							
						1.5							
						2.0			Terminated @ 2.0m				
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Excavation

Excavation ID. - TP 46
sheet: 1 of 1
project no.
date excavated: 14/8/20
date completed: 14/8/20
logged by: CS
checked by:

client: *Clough*
principal:
project: *Perdaman Urea*
location: *Dampier*

position: Not Specified
equipment type:
surface elevation: Not Specified
excavation method:
pit orientation:
excavation dimensions:

excavation information							material substance						
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
EN			N/A						Sandy Clay/Gravel, fc gravel, fc gravel, clay is low to med plasticity. ~~bedrock~~				± 200 mm FILL on surface, Shell fragments were observed
				PSD/ Alone 21-23		0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5			TP Terminated @ 2.3m				

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane sheapeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

APPENDIX I: SUPPLEMENTARY REPORTS

DRAFT

CHAIN OF CUSTODY RECORD

☐ Sydney Laboratory ☐ Brisbane Laboratory ☐ Perth Laboratory ☐ Melbourne Laboratory

Company	Enveng Group	Project №		Project Manager	
Address		Project Name	PERDAMAN ASS	EDD Format (ESdat EQuis etc)	Facility Code
Contact Name					
Phone №					
Special Directions					
Purchase Order					
Quote ID №					

Sampler(s)	CS
Handed over by	
Email for Invoice	
Email to Results	

Analyses (Write range on separate line for each TOP to 15 food SUITE code and tick boxes below SUITE group)

Containers (Change container size & type if necessary)

Required Turnaround Time (TAT) (Default is 5 days Email results)

☐ Overnight (reporting by 9am)♦
☐ Same day♦ ☑ 1 day♦
☐ 2 days♦ ☐ 3 days♦
☐ 5 days (Standard)
☐ Other( )

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Soil (S) Water (W))	S4 - ASS pH : Add Sulfate Soils Field pH Test	Dry & Hold	* X13 - %H2O Set : Moisture Set	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	TP18-0.25	12/08/20	Soil	X	X	X									
2	TP18-0.50	12/08/20	Soil	X	X	X									
3	TP18-0.75	12/08/20	Soil	X	X	X									
4	TP18-1.0	12/08/20	Soil	X	X	X									
5	TP38-0.25	12/08/20	Soil	X	X	X									
6	TP38-0.50	12/08/20	Soil	X	X	X									
7	TP38-0.75	12/08/20	Soil	X	X	X									
8															
9															
10															
	Add Rows		Total Counts	7	7	7									

Date/Time: 14/8/20 9:30
Chilled: (Yes) NO
Temp: 16.0
15.8
15.0
Correction: -0.2
Final Temp: 15.1

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name	Signature	Date	Time

Laboratory Use Only										
Received By	Caitlyn Gibson	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		13/08/20	Time	9:30 AM	Temperature	15.1
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	Date		Time		Report №	737826

Eurofins Environment Testing Australia Pty Ltd

Submission of samples to the laboratory will be deemed as acceptance of Eurofins Lab Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins Lab Standard Terms and Conditions is available on request.

#AU06_EnviroSampleWA

From: Friday, 14 August 2020 11:15 AM
Sent: Matthew Deaves; #AU06_EnviroSampleWA
To: Robert Johnston
Cc: RE: Perdaman Ass Samples
Subject:

Morning Matt

As usual mate, you are spot on.

Cheers

Director
+61 459 837 618

From: Matthew Deaves <MatthewDeaves@eurofins.com>
Sent: Friday, 14 August 2020 10:57 AM
To: EnviroSampleWA@eurofins.com; Simon French-Bluhm <simonfb@enveng-group.com.au>
Cc: Robert Johnston <RobertJohnston@eurofins.com>
Subject: RE: Perdaman Ass Samples

Thanks Caitlyn

Simon FYI as agreed we will proceed with the indicated analysis on all received batches/samples for this project, unless you inform otherwise.

Matt Deaves
State Manager, WA

Eurofins | Environment Testing AU/NZ
Phone: +61 (0)8 9251 9601
Mobile: +61 (0)4 2816 8083

Subscribe

From: #AU06_EnviroSampleWA <EnviroSampleWA@eurofins.com>
Sent: Friday, 14 August 2020 10:50
To: S> **Subject:** Perdaman Ass Samples

Hi Simon,

We have received x7 soil samples this morning. I have made a COC attached to this email with the following analysis; Acid sulphate soil, %moisture and Dry&Hold.
If you could please check the COC and confirm the analysis that would be great.

Kind regards,
Caitlyn

Eurofins | Environment Testing
Unit 2, 91 Leach Highway
KEWDALE WA 6105
Australia

Phone : +61 8 9251 9692
Email : EnviroSampleWA@eurofins.com

Click here to report this email as spam.

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Site # 1254 & 14271

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Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name:	Enveng Group
Contact name:	PERDAMAN ASS Not
Project name:	provided
Project ID:	1 Day
Turnaround time:	Aug 14, 2020 9:30 AM
Date/Time received	737826
Eurofins reference	

Sample Information

✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

✓ All samples have been received as described on the above COC.

✓ COC has been completed correctly.

✓ Attempt to chill was evident.

✓ Appropriately preserved sample containers have been used.

✓ All samples were received in good condition.

✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

✓ Appropriate sample containers have been used.

N/A Sample containers for volatile analysis received with zero headspace.

✕ Split sample sent to requested external lab.

✕ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Robert Johnston on phone : or by email: RobertJohnston@eurofins.com

Results will be delivered electronically via email to Simon French-Bluhm - simonfb@enveng-group.com.au.

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43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Enveng Group
Address: Unit 3, 19 Caloundra Road
Clarkson
WA 6030

Project Name: PERDAMAN ASS

Order No.:
Report #: 737826
Phone:
Fax:

Received: Aug 14, 2020 9:30 AM
Due: Aug 17, 2020
Priority: 1 Day
Contact Name: Simon French-Bluhm

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Subsampling for Perth Analysis	Acid Sulfate Soils Field pH Test	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736						X	X	X
Newcastle Laboratory								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TP18-0.25	Aug 12, 2020		Soil	P20-Au20633	X	X	X
2	TP18-0.50	Aug 12, 2020		Soil	P20-Au20634	X	X	X
3	TP18-0.75	Aug 12, 2020		Soil	P20-Au20635	X	X	X
4	TP18-1.0	Aug 12, 2020		Soil	P20-Au20636	X	X	X
5	TP38-0.25	Aug 12, 2020		Soil	P20-Au20637	X	X	X
6	TP38-0.50	Aug 12, 2020		Soil	P20-Au20638	X	X	X
7	TP38-0.75	Aug 12, 2020		Soil	P20-Au20639	X	X	X
Test Counts						7	7	7

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 23736

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Enveng Group
Unit 3, 19 Caloundra Road
Clarkson
WA 6030

Attention:

Report	**737826-S**
Project name	PERDAMAN ASS
Received Date	Aug 13, 2020

Client Sample ID			**TP18-0.25**	**TP18-0.50**	**TP18-0.75**	**TP18-1.0**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**P20-Au20633**	**P20-Au20634**	**P20-Au20635**	**P20-Au20636**
Date Sampled			**Aug 12, 2020**	**Aug 12, 2020**	**Aug 12, 2020**	**Aug 12, 2020**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.2	9.3	9.2	9.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.9	7.9	7.9	7.9
Reaction Ratings*[S05]	-	comment	1.0	1.0	2.0	2.0
% Moisture	1	%	5.0	7.2	11	19

Client Sample ID			**TP38-0.25**	**TP38-0.50**	**TP38-0.75**
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**P20-Au20637**	**P20-Au20638**	**P20-Au20639**
Date Sampled			**Aug 12, 2020**	**Aug 12, 2020**	**Aug 12, 2020**
Test/Reference	LOR	Unit			
Acid Sulfate Soils Field pH Test					
pH-F (Field pH test)*	0.1	pH Units	9.7	9.7	9.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.1	8.3	8.1
Reaction Ratings*[S05]	-	comment	1.0	1.0	1.0
% Moisture	1	%	8.8	12	15

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Perth	Aug 14, 2020	7 Days
- Method: LTM-GEN- 7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
% Moisture	Perth	Aug 14, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

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IANZ # 1290

Company Name: Enveng Group
Address: Unit 3, 19 Caloundra Road
Clarkson
WA 6030

Project Name: PERDAMAN ASS

Order No.:
Report #: 737826
Phone:
Fax:

Received: Aug 14, 2020 9:30 AM
Due: Aug 17, 2020
Priority: 1 Day
Contact Name: Simon French-Bluhm

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Subsampling for Perth Analysis	Acid Sulfate Soils Field pH Test	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736						X	X	X
Newcastle Laboratory								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TP18-0.25	Aug 12, 2020		Soil	P20-Au20633	X	X	X
2	TP18-0.50	Aug 12, 2020		Soil	P20-Au20634	X	X	X
3	TP18-0.75	Aug 12, 2020		Soil	P20-Au20635	X	X	X
4	TP18-1.0	Aug 12, 2020		Soil	P20-Au20636	X	X	X
5	TP38-0.25	Aug 12, 2020		Soil	P20-Au20637	X	X	X
6	TP38-0.50	Aug 12, 2020		Soil	P20-Au20638	X	X	X
7	TP38-0.75	Aug 12, 2020		Soil	P20-Au20639	X	X	X
Test Counts						7	7	7

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
ug/L: micrograms per litre
ppm: Parts per million
ppb: Parts per billion
%: Percentage
org/100mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Au20633	CP	pH Units	9.2	9.2	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Au20633	CP	pH Units	7.9	7.9	pass	30%	Pass	
Reaction Ratings*	P20-Au20633	CP	comment	1.0	1.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	P20-Au20633	CP	%	5.0	4.6	9.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Robert Johnston	Analytical Services Manager
Rhys Thomas	Senior Analyst-SPOCAS (WA)

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

#AU06_EnviroSampleWA

From: Tuesday, 18 August 2020 2:59 PM
Sent: #AU06_EnviroSampleWA
To: RE: 18/8/20 Perdaman Samples
Subject:

Afternoon Caitlyn

Confirmed, many thanks.

There should be more coming or on its way.

Cheers

Director
+61 459 837 618

From: **Sent:** Tuesday, 18 August 2020 2:55 PM
To:
Subject: 18/8/20 Perdaman Samples

Hi Simon,

We have received x15 soil sample as seen in the COC attached. Can you please confirm.

Kind regards,
Caitlyn

Click here to report this email as spam.

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CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

☐ Sydney Laboratory
02 9900 8400

☐ Brisbane Laboratory
Unit 1 21 Smallwood Place Murarrie QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

☑ Perth Laboratory

☐ Melbourne Laboratory

Company	Enveng Group	Project No		Project Manager	
Address		Project Name	PERDAMAN ASS	EDD Format (Type, CSV, etc)	
Contact Name					
Phone No					
Special Directions					
Purchase Order					
Quote ID No					

Facility Code

Sample(s) CS

Handed over by

Email for Invoice

Email for Results

Analyses (check each as required, check both "Field" & "Lab" if both required. SUITE code must be specific about FIELD testing)

Containers (Change container type & size if necessary)

Required Turnaround Time (TAT) (default will be 5 days if left blank)

☐ Overnight (reporting by 9am)♦
☐ Same day♦ ☑ 1 day♦
☐ 2 days♦ ☐ 3 days♦
☐ 5 days (Standard)
☐ Other( )

♦Surcharge will apply

No	Client Sample ID	Sampled Date/Time (dd/mm/yy or mm)	Matrix (Soil/S Water/W)	S4 - ASS pH - Add Sulfate Soils Field pH Test	Dry & Hold	X13 - %H2O Set - Moisture Set	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	TP03_0.25	13/08/20	Soil	X	X	X									
2	TP03_0.5	13/08/20	Soil	X	X	X									
3	TP03_0.75	13/08/20	Soil	X	X	X									
4	TP03_1.0	13/08/20	Soil	X	X	X									
5	TP03_1.25	13/08/20	Soil	X	X	X									
6	TP24_0.25	13/08/20	Soil	X	X	X									
7	TP24_0.5	13/08/20	Soil	X	X	X									
8	TP24_0.75	13/08/20	Soil	X	X	X									
9	TP24_1.0	13/08/20	Soil	X	X	X									
10	TP50_0.25	14/08/20	Soil	X	X	X									
11	TP50_0.5	14/08/20	Soil	X	X	X									
12	TP58_0.25	14/08/20	Soil	X	X	X									
13	TP58_0.5	14/08/20	Soil	X	X	X									
14	TP58_0.75	14/08/20	Soil	X	X	X									
15	TP58_1.0	14/08/20	Soil	X	X	X									
16															
17															
18															
19															
20															
	Add Rows		Total Counts	15	15	15									

Method of Shipment	☐ Courier (#	☐ Hand Delivered	☐ Postal	Name	Signature	Date	Time

Laboratory Use Only											
Received By	Monique Jackson	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	18/08/20	Time	2:00 PM	Temperature	18.4
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Report No	738493

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request

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IANZ # 1327

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Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name:	Enveng Group
Contact name:	Simon French-Bluhm
Project name:	PERDAMAN ASS
Project ID:	Not provided
Turnaround time:	1 Day
Date/Time received	Aug 18, 2020 2:00 PM
Eurofins reference	738493

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✗ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- N/A Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Robert Johnston on phone : or by email: RobertJohnston@eurofins.com

Results will be delivered electronically via email to Simon French-Bluhm - simonfb@enveng-group.com.au.

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Phone : 0800 856 450
IANZ # 1290

Company Name: Enveng Group
Address: Unit 3, 19 Caloundra Road
Clarkson
WA 6030

Project Name: PERDAMAN ASS

Order No.:
Report #: 738493
Phone:
Fax:

Received: Aug 18, 2020 2:00 PM
Due: Aug 19, 2020
Priority: 1 Day
Contact Name: Simon French-Bluhm

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Subsampling for Perth Analysis	Acid Sulfate Soils Field pH Test	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736						X	X	X
Newcastle Laboratory								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TP03_0.25	Aug 13, 2020		Soil	P20-Au26314	X	X	X
2	TP03_0.5	Aug 13, 2020		Soil	P20-Au26315	X	X	X
3	TP03_0.75	Aug 13, 2020		Soil	P20-Au26316	X	X	X
4	TP03_1.0	Aug 13, 2020		Soil	P20-Au26317	X	X	X
5	TP03_1.25	Aug 13, 2020		Soil	P20-Au26318	X	X	X
6	TP24_0.25	Aug 13, 2020		Soil	P20-Au26319	X	X	X
7	TP24_0.5	Aug 13, 2020		Soil	P20-Au26320	X	X	X
8	TP24_0.75	Aug 13, 2020		Soil	P20-Au26321	X	X	X
9	TP24_1.0	Aug 13, 2020		Soil	P20-Au26322	X	X	X
10	TP50_0.25	Aug 14, 2020		Soil	P20-Au26323	X	X	X

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736						X	X	X
11	TP50_0.5	Aug 14, 2020		Soil	P20-Au26324	X	X	X
12	TP58_0.25	Aug 14, 2020		Soil	P20-Au26325	X	X	X
13	TP58_0.5	Aug 14, 2020		Soil	P20-Au26326	X	X	X
14	TP58_0.75	Aug 14, 2020		Soil	P20-Au26327	X	X	X
15	TP58_1.0	Aug 14, 2020		Soil	P20-Au26328	X	X	X
Test Counts						15	15	15

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 23736

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Enveng Group
Unit 3, 19 Caloundra Road
Clarkson
WA 6030

Attention:

Report	**738493-S**
Project name	PERDAMAN ASS
Received Date	Aug 18, 2020

Client Sample ID			**TP03_0.25**	**TP03_0.5**	**TP03_0.75**	**TP03_1.0**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**P20-Au26314**	**P20-Au26315**	**P20-Au26316**	**P20-Au26317**
Date Sampled			**Aug 13, 2020**	**Aug 13, 2020**	**Aug 13, 2020**	**Aug 13, 2020**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.9	9.3	9.5	9.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.9	7.8	7.8	7.8
Reaction Ratings*[S05]	-	comment	3.0	2.0	1.0	2.0
% Moisture	1	%	13	20	19	14

Client Sample ID			**TP03_1.25**	**TP24_0.25**	**TP24_0.5**	**TP24_0.75**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**P20-Au26318**	**P20-Au26319**	**P20-Au26320**	**P20-Au26321**
Date Sampled			**Aug 13, 2020**	**Aug 13, 2020**	**Aug 13, 2020**	**Aug 13, 2020**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.5	9.8	9.0	9.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.8	7.9	7.8	7.9
Reaction Ratings*[S05]	-	comment	2.0	2.0	2.0	2.0
% Moisture	1	%	11	19	22	14

Client Sample ID			**TP24_1.0**	**TP50_0.25**	**TP50_0.5**	**TP58_0.25**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**P20-Au26322**	**P20-Au26323**	**P20-Au26324**	**P20-Au26325**
Date Sampled			**Aug 13, 2020**	**Aug 14, 2020**	**Aug 14, 2020**	**Aug 14, 2020**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.1	9.0	9.0	9.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.7	7.1	7.4	7.9
Reaction Ratings*[S05]	-	comment	2.0	4.0	4.0	2.0
% Moisture	1	%	21	5.5	6.1	17

Client Sample ID			TP58_0.5	TP58_0.75	TP58_1.0
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**P20-Au26326**	**P20-Au26327**	**P20-Au26328**
Date Sampled			**Aug 14, 2020**	**Aug 14, 2020**	**Aug 14, 2020**
Test/Reference	LOR	Unit			
Acid Sulfate Soils Field pH Test					
pH-F (Field pH test)*	0.1	pH Units	9.4	9.3	9.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.0	7.8	7.9
Reaction Ratings*[S05]	-	comment	2.0	2.0	2.0
% Moisture	1	%	15	13	15

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Perth	Aug 18, 2020	7 Days
- Method: LTM-GEN- 7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
% Moisture	Perth	Aug 18, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

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Priority: 1 Day
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Eurofins Analytical Services Manager : Robert Johnston

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Melbourne Laboratory - NATA Site # 1254 & 14271								
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3	TP03_0.75	Aug 13, 2020		Soil	P20-Au26316	X	X	X
4	TP03_1.0	Aug 13, 2020		Soil	P20-Au26317	X	X	X
5	TP03_1.25	Aug 13, 2020		Soil	P20-Au26318	X	X	X
6	TP24_0.25	Aug 13, 2020		Soil	P20-Au26319	X	X	X
7	TP24_0.5	Aug 13, 2020		Soil	P20-Au26320	X	X	X
8	TP24_0.75	Aug 13, 2020		Soil	P20-Au26321	X	X	X
9	TP24_1.0	Aug 13, 2020		Soil	P20-Au26322	X	X	X
10	TP50_0.25	Aug 14, 2020		Soil	P20-Au26323	X	X	X

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Perth Laboratory - NATA Site # 23736						X	X	X
11	TP50_0.5	Aug 14, 2020		Soil	P20-Au26324	X	X	X
12	TP58_0.25	Aug 14, 2020		Soil	P20-Au26325	X	X	X
13	TP58_0.5	Aug 14, 2020		Soil	P20-Au26326	X	X	X
14	TP58_0.75	Aug 14, 2020		Soil	P20-Au26327	X	X	X
15	TP58_1.0	Aug 14, 2020		Soil	P20-Au26328	X	X	X
Test Counts						15	15	15

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
ug/L: micrograms per litre
ppm: Parts per million
ppb: Parts per billion
%: Percentage
org/100mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	P20-Au26321	CP	%	14	12	17	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Au26322	CP	pH Units	9.1	9.1	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Au26322	CP	pH Units	7.7	7.7	pass	30%	Pass	
Reaction Ratings*	P20-Au26322	CP	comment	2.0	2.0	pass	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Robert Johnston	Analytical Services Manager
Rhys Thomas	Senior Analyst-SPOCAS (WA)

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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#AU06_EnviroSampleWA

From:
Sent: Thursday, 20 August 2020 10:50 AM
To: #AU06_EnviroSampleWA
Subject: 5 DAY: Eurofins Test Results - Report 738493 : Site PERDAMAN ASS

ADDITIONAL ANALYSIS – 5 DAY TAT

From:
Sent: Thursday, 20 August 2020 8:28
To:
Subject: RE: Eurofins Test Results - Report 738493 : Site PERDAMAN ASS

EXTERNAL EMAIL*

Morning Rob

Can you please schedule the below samples for SPOCAS and CRS please.

Sample ID	Lab Ref	Report ID
TP18-0.75	P20-Au20635	737826-S
TP18-1.0	P20-Au20636	737826-S
TP38-0.25	P20-Au20637	737826-S
TP38-0.75	P20-Au20639	737826-S
TP03_0.25	P20-Au26314	738493-S
TP03_1.0	P20-Au26317	738493-S
TP24_0.5	P20-Au26320	738493-S
TP24_0.75	P20-Au26321	738493-S
TP50_0.25	P20-Au26323	738493-S
TP50_0.5	P20-Au26324	738493-S
TP58_0.75	P20-Au26327	738493-S
TP58_1.0	P20-Au26328	738493-S

Director
+61 459 837 618

From: **Sent:** Wednesday, 19 August 2020 5:50 PM
To:
Subject: Eurofins Test Results - Report 738493 : Site PERDAMAN ASS

Hi Simon,

Please find attached results for PERDAMAN ASS.

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Sample Receipt Advice

Company name:	Enveng Group
Contact name:	PERDAMAN ASS Not
Project name:	provided
Project ID:	5 Day
Turnaround time:	Aug 20, 2020 8:28 AM
Date/Time received	739074
Eurofins reference	

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
N/A	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✗	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
N/A	Sample containers for volatile analysis received with zero headspace.
✗	Split sample sent to requested external lab.
✗	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Robert Johnston on phone : or by email: RobertJohnston@eurofins.com

Results will be delivered electronically via email to Simon French-Bluhm - simonfb@enveng-group.com.au.

Global Leader - Results you can trust

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Company Name: Enveng Group
Address: Unit 3, 19 Caloundra Road
Clarkson
WA 6030

Project Name: PERDAMAN ASS

Order No.:
Report #: 739074
Phone:
Fax:

Received: Aug 20, 2020 8:28 AM
Due: Aug 27, 2020
Priority: 5 Day
Contact Name: Simon French-Bluhm

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Moisture Set	ASS Super Suite (WA)-ANC
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							X
Perth Laboratory - NATA Site # 23736						X	
Newcastle Laboratory							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	TP18-0.75	Aug 12, 2020		Soil	P20-Au31226	X	X
2	TP18-1.0	Aug 12, 2020		Soil	P20-Au31227	X	X
3	TP38-0.25	Aug 12, 2020		Soil	P20-Au31228	X	X
4	TP38-0.75	Aug 12, 2020		Soil	P20-Au31229	X	X
5	TP03_0.25	Aug 13, 2020		Soil	P20-Au31230	X	X
6	TP03_1.0	Aug 13, 2020		Soil	P20-Au31231	X	X
7	TP24_0.5	Aug 13, 2020		Soil	P20-Au31232	X	X
8	TP24_0.75	Aug 13, 2020		Soil	P20-Au31233	X	X
9	TP50_0.25	Aug 14, 2020		Soil	P20-Au31234	X	X
10	TP50_0.5	Aug 14, 2020		Soil	P20-Au31235	X	X

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Sample Detail						Moisture Set	ASS Super Suite (WA)-ANC
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							X
Perth Laboratory - NATA Site # 23736						X	
11	TP58_0.75	Aug 14, 2020		Soil	P20-Au31236	X	X
12	TP58_1.0	Aug 14, 2020		Soil	P20-Au31237	X	X
Test Counts						12	12

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 23736

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Enveng Group
Unit 3, 19 Caloundra Road
Clarkson
WA 6030

Attention: **739074-S**

Report PERDAMAN ASS Aug 20, 2020

Project name

Received Date

Client Sample ID			**TP18-0.75**	**TP18-1.0**	**TP38-0.25**	**TP38-0.75**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**P20-Au31226**	**P20-Au31227**	**P20-Au31228**	**P20-Au31229**
Date Sampled			**Aug 12, 2020**	**Aug 12, 2020**	**Aug 12, 2020**	**Aug 12, 2020**
Test/Reference	LOR	Unit				
ASS Super Suite (WA)-ANC						
pH-KCL	0.1	pH Units	9.7	9.6	9.4	9.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
pH-OX	0.1	pH Units	8.0	8.0	7.8	8.0
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TPA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Acid trail - Titratable Sulfidic Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TSA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	0.02	0.02	< 0.02	< 0.02
Sulfur - Peroxide	0.02	% S	0.10	0.06	< 0.02	0.02
Sulfur - Peroxide Oxidisable Sulfur	0.02	% S	0.08	< 0.02	< 0.02	< 0.02
acidity - Peroxide Oxidisable Sulfur	10	mol H+/t	48	< 10	< 10	< 10
Calcium - KCl Extractable	0.02	% Ca	0.13	0.14	0.15	0.16
Calcium - Peroxide	0.02	% Ca	14	10	1.9	3.5
Acid Reacted Calcium	0.02	% Ca	14	10	1.7	3.4
sulfidic - Acid Reacted Ca equiv. S% pyrite	0.02	% S	11	8.3	1.4	2.7
acidity - Acid Reacted Calcium	10	mol H+/t	6800	5200	870	1700
Magnesium - KCl Extractable	0.02	% Mg	0.06	0.06	0.06	0.06
Magnesium - Peroxide	0.02	% Mg	0.92	0.63	0.28	0.31
Acid Reacted Magnesium	0.02	% Mg	0.86	0.56	0.21	0.25
sulfidic - Acid Reacted Mg equiv. S% pyrite	0.02	% S	1.1	0.74	0.28	0.34
acidity - Acid Reacted Magnesium	10	mol H+/t	710	460	180	210
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCE)	0.02	% CaCO3	40	29	5.4	10
Acid Neutralising Capacity - Acidity units (a-ANCE)	10	mol H+/t	7900	5800	1100	2000
Acid Neutralising Capacity - equivalent S% pyrite(s-ANCE)	0.02	% S	13	9.3	1.7	3.2
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	50	37	8.5	12
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	10000	7400	1700	2400
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	16	12	2.7	3.9
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5

Client Sample ID			TP18-0.75	TP18-1.0	TP38-0.25	TP38-0.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Au31226	P20-Au31227	P20-Au31228	P20-Au31229
Date Sampled			Aug 12, 2020	Aug 12, 2020	Aug 12, 2020	Aug 12, 2020
Test/Reference	LOR	Unit				
ASS Super Suite (WA)-ANC						
SPOCAS - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
SPOCAS - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
SPOCAS - Liming rate	1	kg CaCO3/t	< 1	< 1	< 1	< 1
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	0.02	% S	0.08	< 0.02	< 0.02	< 0.02
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	2	mol H+/t	48	< 2	< 2	< 2
SPOCAS WA (- ANC) - Liming rate	1	kg CaCO3/t	3.6	< 1	< 1	< 1
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	< 1	< 1	< 1
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO3/t	< 1	< 1	< 1	< 1
<2mm Fraction	0.005	g	43	47	49	40
>2mm Fraction	0.005	g	< 0.005	0.83	2.0	6.5
Analysed Material	0.1	%	100	98	96	86
Extraneous Material	0.1	%	< 0.1	1.7	3.8	14
% Moisture	1	%	14	17	12	12

Client Sample ID			TP03_0.25	TP03_1.0	TP24_0.5	TP24_0.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Au31230	P20-Au31231	P20-Au31232	P20-Au31233
Date Sampled			Aug 13, 2020	Aug 13, 2020	Aug 13, 2020	Aug 13, 2020
Test/Reference	LOR	Unit				
ASS Super Suite (WA)-ANC						
pH-KCL	0.1	pH Units	9.5	9.5	9.5	9.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
pH-OX	0.1	pH Units	8.3	8.0	8.1	7.9
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TPA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Acid trail - Titratable Sulfidic Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TSA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	0.10	0.04	0.08	0.03
Sulfur - Peroxide	0.02	% S	0.16	0.04	0.13	0.04
Sulfur - Peroxide Oxidisable Sulfur	0.02	% S	0.06	< 0.02	< 0.02	< 0.02
acidity - Peroxide Oxidisable Sulfur	10	mol H+/t	37	< 10	< 10	< 10
Calcium - KCl Extractable	0.02	% Ca	0.20	0.15	0.16	0.13
Calcium - Peroxide	0.02	% Ca	15	13	14	20
Acid Reacted Calcium	0.02	% Ca	15	13	14	20
sulfidic - Acid Reacted Ca equiv. S% pyrite	0.02	% S	12	11	11	16
acidity - Acid Reacted Calcium	10	mol H+/t	7300	6600	7100	9800
Magnesium - KCl Extractable	0.02	% Mg	0.12	0.06	0.10	0.05
Magnesium - Peroxide	0.02	% Mg	0.98	0.17	2.9	1.1
Acid Reacted Magnesium	0.02	% Mg	0.86	0.12	2.8	1.0
sulfidic - Acid Reacted Mg equiv. S% pyrite	0.02	% S	1.1	0.15	3.6	1.3

Client Sample ID			TP03_0.25	TP03_1.0	TP24_0.5	TP24_0.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Au31230	P20-Au31231	P20-Au31232	P20-Au31233
Date Sampled			Aug 13, 2020	Aug 13, 2020	Aug 13, 2020	Aug 13, 2020
Test/Reference	LOR	Unit				
ASS Super Suite (WA)-ANC						
acidity - Acid Reacted Magnesium	10	mol H+/t	710	96	2300	820
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCE)	0.02	% CaCO3	41	32	48	55
Acid Neutralising Capacity - Acidity units (a-ANCE)	10	mol H+/t	8300	6400	9500	11000
Acid Neutralising Capacity - equivalent S% pyrite(s-ANCE)	0.02	% S	13	10	15	18
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	58	34	54	68
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	12000	6900	11000	14000
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	19	11	17	22
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
SPOCAS - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
SPOCAS - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
SPOCAS - Liming rate	1	kg CaCO3/t	< 1	< 1	< 1	< 1
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	0.02	% S	0.06	< 0.02	< 0.02	< 0.02
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	2	mol H+/t	37	< 2	< 2	< 2
SPOCAS WA (- ANC) - Liming rate	1	kg CaCO3/t	2.8	< 1	< 1	< 1
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	< 1	< 1	< 1
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO3/t	< 1	< 1	< 1	< 1
<2mm Fraction	0.005	g	39	46	45	79
>2mm Fraction	0.005	g	11	15	16	< 0.005
Analysed Material	0.1	%	77	75	73	100
Extraneous Material	0.1	%	23	25	27	< 0.1
% Moisture	1	%	21	18	21	15

Client Sample ID			TP50_0.25	TP50_0.5	TP58_0.75	TP58_1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Au31234	P20-Au31235	P20-Au31236	P20-Au31237
Date Sampled			Aug 14, 2020	Aug 14, 2020	Aug 14, 2020	Aug 14, 2020
Test/Reference	LOR	Unit				
ASS Super Suite (WA)-ANC						
pH-KCL	0.1	pH Units	8.9	8.8	9.5	9.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
pH-OX	0.1	pH Units	6.6	6.4	8.2	7.9
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TPA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Acid trail - Titratable Sulfidic Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TSA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005

Client Sample ID			TP50_0.25	TP50_0.5	TP58_0.75	TP58_1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Au31234	P20-Au31235	P20-Au31236	P20-Au31237
Date Sampled			Aug 14, 2020	Aug 14, 2020	Aug 14, 2020	Aug 14, 2020
Test/Reference	LOR	Unit				
ASS Super Suite (WA)-ANC						
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	< 0.02	0.05	0.04
Sulfur - Peroxide	0.02	% S	< 0.02	< 0.02	0.05	0.05
Sulfur - Peroxide Oxidisable Sulfur	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
acidity - Peroxide Oxidisable Sulfur	10	mol H+/t	< 10	< 10	< 10	< 10
Calcium - KCl Extractable	0.02	% Ca	0.22	0.23	0.15	0.15
Calcium - Peroxide	0.02	% Ca	0.51	0.34	8.5	10
Acid Reacted Calcium	0.02	% Ca	0.30	0.11	8.3	10
sulfidic - Acid Reacted Ca equiv. S% pyrite	0.02	% S	0.24	0.09	6.7	8.0
acidity - Acid Reacted Calcium	10	mol H+/t	150	56	4100	5000
Magnesium - KCl Extractable	0.02	% Mg	0.02	0.02	0.07	0.06
Magnesium - Peroxide	0.02	% Mg	0.05	0.03	0.19	0.29
Acid Reacted Magnesium	0.02	% Mg	0.02	< 0.02	0.12	0.23
sulfidic - Acid Reacted Mg equiv. S% pyrite	0.02	% S	0.03	< 0.02	0.15	0.30
acidity - Acid Reacted Magnesium	10	mol H+/t	20	< 10	96	190
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCE)	0.02	% CaCO3	0.88	n/a	21	26
Acid Neutralising Capacity - Acidity units (a-ANCE)	10	mol H+/t	180	n/a	4200	5200
Acid Neutralising Capacity - equivalent S% pyrite(s-ANCE)	0.02	% S	0.28	n/a	6.8	8.3
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	1.2	1.0	25	32
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	240	200	4900	6300
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	0.39	0.32	7.9	10
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
SPOCAS - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
SPOCAS - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
SPOCAS - Liming rate	1	kg CaCO3/t	< 1	< 1	< 1	< 1
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	2	mol H+/t	< 2	< 2	< 2	5.4
SPOCAS WA (- ANC) - Liming rate	1	kg CaCO3/t	< 1	< 1	< 1	< 1
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	< 1	< 1	< 1
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO3/t	< 1	< 1	< 1	< 1
<2mm Fraction	0.005	g	25	25	58	63
>2mm Fraction	0.005	g	4.9	9.5	< 0.005	22
Analysed Material	0.1	%	84	73	100	74
Extraneous Material	0.1	%	16	27	< 0.1	26
% Moisture	1	%	7.6	5.7	11	15

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
ASS Super Suite (WA)-ANC	Brisbane	Aug 24, 2020	0 Days
- Method: LTM-GEN-7050 Suspension Peroxide Oxidation Combined Acidity and Sulfur (SPOCAS)			
% Moisture	Perth	Aug 20, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name:	Enveng Group	**Order No.:**		**Received:**	Aug 20, 2020 8:28 AM
Address:	Unit 3, 19 Caloundra Road Clarkson WA 6030	**Report #:**	739074	**Due:**	Aug 27, 2020
		Phone:		**Priority:**	5 Day
		Fax:		**Contact Name:**	Simon French-Bluhm
Project Name:	PERDAMAN ASS				

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Moisture Set	ASS Super Suite (WA)-ANC
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							X
Perth Laboratory - NATA Site # 23736						X	
Newcastle Laboratory							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	TP18-0.75	Aug 12, 2020		Soil	P20-Au31226	X	X
2	TP18-1.0	Aug 12, 2020		Soil	P20-Au31227	X	X
3	TP38-0.25	Aug 12, 2020		Soil	P20-Au31228	X	X
4	TP38-0.75	Aug 12, 2020		Soil	P20-Au31229	X	X
5	TP03_0.25	Aug 13, 2020		Soil	P20-Au31230	X	X
6	TP03_1.0	Aug 13, 2020		Soil	P20-Au31231	X	X
7	TP24_0.5	Aug 13, 2020		Soil	P20-Au31232	X	X
8	TP24_0.75	Aug 13, 2020		Soil	P20-Au31233	X	X
9	TP50_0.25	Aug 14, 2020		Soil	P20-Au31234	X	X
10	TP50_0.5	Aug 14, 2020		Soil	P20-Au31235	X	X

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Phone : 0800 856 450
IANZ # 1290

Company Name: Enveng Group
Address: Unit 3, 19 Caloundra Road
Clarkson
WA 6030

Project Name: PERDAMAN ASS

Order No.:
Report #: 739074
Phone:
Fax:

Received: Aug 20, 2020 8:28 AM
Due: Aug 27, 2020
Priority: 5 Day
Contact Name: Simon French-Bluhm

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Moisture Set	ASS Super Suite (WA)-ANC
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							X
Perth Laboratory - NATA Site # 23736						X	
11	TP58_0.75	Aug 14, 2020		Soil	P20-Au31236	X	X
12	TP58_1.0	Aug 14, 2020		Soil	P20-Au31237	X	X
Test Counts						12	12

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
ug/L: micrograms per litre
ppm: Parts per million
ppb: Parts per billion
%: Percentage
org/100mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
ASS Super Suite (WA)-ANC									
pH-KCL			%	98			80-120	Pass	
Acid trail - Titratable Actual Acidity			%	104			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
ASS Super Suite (WA)-ANC				Result 1	Result 2	RPD			
pH-KCL	P20-Au31226	CP	pH Units	9.7	9.7	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P20-Au31226	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P20-Au31226	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
pH-OX	P20-Au31226	CP	pH Units	8.0	8.0	<1	30%	Pass	
Acid trail - Titratable Peroxide Acidity	P20-Au31226	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TPA equiv. S% pyrite	P20-Au31226	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Acid trail - Titratable Sulfidic Acidity	P20-Au31226	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TSA equiv. S% pyrite	P20-Au31226	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P20-Au31226	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	P20-Au31226	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	P20-Au31226	CP	% S	0.02	0.02	2.0	30%	Pass	
Sulfur - Peroxide	P20-Au31226	CP	% S	0.10	0.11	9.0	30%	Pass	
Sulfur - Peroxide Oxidisable Sulfur	P20-Au31226	CP	% S	0.08	0.09	10	30%	Pass	
acidity - Peroxide Oxidisable Sulfur	P20-Au31226	CP	mol H+/t	48	54	10	30%	Pass	
Calcium - KCl Extractable	P20-Au31226	CP	% Ca	0.13	0.13	<1	30%	Pass	
Calcium - Peroxide	P20-Au31226	CP	% Ca	14	14	<1	30%	Pass	
Acid Reacted Calcium	P20-Au31226	CP	% Ca	14	14	<1	30%	Pass	
sulfidic - Acid Reacted Ca equiv. S% pyrite	P20-Au31226	CP	% S	11	11	<1	30%	Pass	
acidity - Acid Reacted Calcium	P20-Au31226	CP	mol H+/t	6800	6800	<1	30%	Pass	
Magnesium - KCl Extractable	P20-Au31226	CP	% Mg	0.06	0.06	1.0	30%	Pass	
Magnesium - Peroxide	P20-Au31226	CP	% Mg	0.92	1.0	11	30%	Pass	
Acid Reacted Magnesium	P20-Au31226	CP	% Mg	0.86	0.97	12	30%	Pass	
sulfidic - Acid Reacted Mg equiv. S% pyrite	P20-Au31226	CP	% S	1.1	1.3	12	30%	Pass	
acidity - Acid Reacted Magnesium	P20-Au31226	CP	mol H+/t	710	790	12	30%	Pass	
Acid Neutralising Capacity (ANCE)	P20-Au31226	CP	% CaCO3	40	36	10	30%	Pass	
Acid Neutralising Capacity - Acidity units (a-ANCE)	P20-Au31226	CP	mol H+/t	7900	7100	10	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P20-Au31226	CP	% CaCO3	50	50	1.0	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P20-Au31226	CP	% S	16	16	1.0	30%	Pass	
ANC Fineness Factor	P20-Au31226	CP	factor	1.5	1.5	<1	30%	Pass	
SPOCAS - Net Acidity (Sulfur Units)	P20-Au31226	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
SPOCAS - Net Acidity (Acidity Units)	P20-Au31226	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
SPOCAS - Liming rate	P20-Au31226	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	P20-Au31226	CP	% S	0.08	0.09	10	30%	Pass	
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	P20-Au31226	CP	mol H+/t	48	54	10	30%	Pass	
SPOCAS WA (- ANC) - Liming rate	P20-Au31226	CP	kg CaCO3/t	3.6	4.0	10	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	P20-Au31226	CP	% S	< 0.02	< 0.02	<1	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
ASS Super Suite (WA)-ANC				Result 1	Result 2	RPD			
CRS Suite - Net Acidity (Acidity Units)	P20-Au31226	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate	P20-Au31226	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	P20-Au31226	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	P20-Au31226	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS suite WA (-ANC) - Liming Rate	P20-Au31226	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	P20-Au31229	CP	%	12	11	8.0	30%	Pass	
Duplicate									
ASS Super Suite (WA)-ANC				Result 1	Result 2	RPD			
pH-KCL	P20-Au31236	CP	pH Units	9.5	9.5	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P20-Au31236	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P20-Au31236	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
pH-OX	P20-Au31236	CP	pH Units	8.2	8.2	<1	30%	Pass	
Acid trail - Titratable Peroxide Acidity	P20-Au31236	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TPA equiv. S% pyrite	P20-Au31236	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Acid trail - Titratable Sulfidic Acidity	P20-Au31236	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TSA equiv. S% pyrite	P20-Au31236	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P20-Au31236	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	P20-Au31236	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	P20-Au31236	CP	% S	0.05	0.05	2.0	30%	Pass	
Sulfur - Peroxide	P20-Au31236	CP	% S	0.05	0.05	1.0	30%	Pass	
Sulfur - Peroxide Oxidisable Sulfur	P20-Au31236	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
acidity - Peroxide Oxidisable Sulfur	P20-Au31236	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Calcium - KCl Extractable	P20-Au31236	CP	% Ca	0.15	0.14	2.0	30%	Pass	
Calcium - Peroxide	P20-Au31236	CP	% Ca	8.5	8.8	4.0	30%	Pass	
Acid Reacted Calcium	P20-Au31236	CP	% Ca	8.3	8.7	4.0	30%	Pass	
sulfidic - Acid Reacted Ca equiv. S% pyrite	P20-Au31236	CP	% S	6.7	6.9	4.0	30%	Pass	
acidity - Acid Reacted Calcium	P20-Au31236	CP	mol H+/t	4100	4300	4.0	30%	Pass	
Magnesium - KCl Extractable	P20-Au31236	CP	% Mg	0.07	0.07	2.0	30%	Pass	
Magnesium - Peroxide	P20-Au31236	CP	% Mg	0.19	0.19	4.0	30%	Pass	
Acid Reacted Magnesium	P20-Au31236	CP	% Mg	0.12	0.13	7.0	30%	Pass	
sulfidic - Acid Reacted Mg equiv. S% pyrite	P20-Au31236	CP	% S	0.15	0.17	7.0	30%	Pass	
acidity - Acid Reacted Magnesium	P20-Au31236	CP	mol H+/t	96	100	7.0	30%	Pass	
Acid Neutralising Capacity (ANCE)	P20-Au31236	CP	% CaCO3	21	21	<1	30%	Pass	
Acid Neutralising Capacity - Acidity units (a-ANCE)	P20-Au31236	CP	mol H+/t	4200	4200	<1	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P20-Au31236	CP	% CaCO3	25	24	2.0	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P20-Au31236	CP	% S	7.9	7.7	2.0	30%	Pass	
ANC Fineness Factor	P20-Au31236	CP	factor	1.5	1.5	<1	30%	Pass	
SPOCAS - Net Acidity (Sulfur Units)	P20-Au31236	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
SPOCAS - Net Acidity (Acidity Units)	P20-Au31236	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
SPOCAS - Liming rate	P20-Au31236	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	P20-Au31236	CP	% S	< 0.02	< 0.02	<1	30%	Pass	

Duplicate									
ASS Super Suite (WA)-ANC				Result 1	Result 2	RPD			
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	P20-Au31236	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
SPOCAS WA (- ANC) - Liming rate	P20-Au31236	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	P20-Au31236	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	P20-Au31236	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate	P20-Au31236	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	P20-Au31236	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	P20-Au31236	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS suite WA (-ANC) - Liming Rate	P20-Au31236	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	N/A
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	N/A
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

Authorised By

Analytical Services Manager
Senior Analyst-SPOCAS (QLD)

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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☐ Perth Laboratory
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☐ Melbourne Laboratory
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Company	Enveng Group	Project №		Project Manager	SIMON FRENCH-BLUHM
Address		Project Name	PERDAMAN	EDD Format (E.S.dat / EDIS etc)	
Contact Name				Facility Code	
Phone №					
Special Directions					
Purchase Order					
Quote ID №					

Sampler(s)	
Handed over by	
Email for Invoice	
Email for Results	

Analyses: Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing

Containers: Use space or in-compatibilities of containers

Required Turnaround Time (TAT): Default will be 5 days if not noted

*Surcharge will apply

☐ Overnight (reporting by 9am)*
☐ Same day* ☐ 1 day*
☐ 2 days* ☐ 3 days*
☑ 5 days (Standard)
☐ Other( )

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix Solid (S) Water (W)	S4 - ASS pH : Acid Sulfate Soils Field pH Test	X13 - %H2O Set : Moisture Set	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	HA-TP51_0.25	19/08/20	SOIL	X	X								1	
2	HA-TP57_0.25	19/08/20	SOIL	X	X								1	
3	HA-TP57_0.5	19/08/20	SOIL	X	X								1	
4	HA-TP57_0.75	19/08/20	SOIL	X	X								1	
5	HA-TP57_1.0	19/08/20	SOIL	X	X								1	
6	BH02_0.25	19/08/20	SOIL	X	X								1	
7	BH27_0.25	19/08/20	SOIL	X	X								1	
8														
9														
10														
	Add Rows		Total Counts	7	7								7	

Method of Shipment: ☐ Courier (#) ☐ Hand Delivered ☐ Postal

Name	Signature	Date	Time

Laboratory Use Only									
Received By	R. Thomas	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	[signature]	Date	24/8/20	Time	11:00 AM	Temperature 15.6
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Report № 739851

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request

eurofins | Environment Testing

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IANZ # 1290

Sample Receipt Advice

Company name:	Enveng Group
Contact name:	Simon French-Bluhm
Project name:	PERDAMAN
Project ID:	Not provided
Turnaround time:	5 Day
Date/Time received	Aug 24, 2020 11:00 AM
Eurofins reference	739851

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- N/A Sample containers for volatile analysis received with zero headspace.
- ✕ Split sample sent to requested external lab.
- ✕ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Robert Johnston on phone : or by email: RobertJohnston@eurofins.com

Results will be delivered electronically via email to Simon French-Bluhm - simonfb@enveng-group.com.au.

Global Leader - Results you can trust

eurofins | Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Australia

Melbourne
6 Monterey Road
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NATA # 1261
Site # 1254 & 14271

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NATA # 1261
Site # 23736

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New Zealand

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Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Enveng Group
Address: Unit 3, 19 Caloundra Road
Clarkson
WA 6030

Project Name: PERDAMAN

Order No.:
Report #: 739851
Phone:
Fax:

Received: Aug 24, 2020 11:00 AM
Due: Aug 31, 2020
Priority: 5 Day
Contact Name: Simon French-Bluhm

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736						X	X
Newcastle Laboratory							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	HA-TP51_0.25	Aug 19, 2020		Soil	P20-Au38825	X	X
2	HA-TP57_0.25	Aug 19, 2020		Soil	P20-Au38826	X	X
3	HA-TP57_0.5	Aug 19, 2020		Soil	P20-Au38827	X	X
4	HA-TP57_0.75	Aug 19, 2020		Soil	P20-Au38828	X	X
5	HA-TP57_1.0	Aug 19, 2020		Soil	P20-Au38829	X	X
6	BH02_0.25	Aug 19, 2020		Soil	P20-Au38830	X	X
7	BH27_0.25	Aug 19, 2020		Soil	P20-Au38831	X	X
Test Counts						7	7

eurofins | Environment Testing

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 23736

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Enveng Group
Unit 3, 19 Caloundra Road
Clarkson
WA 6030

Attention: **Simon French-Bluhm**

Report **739851-S**
Project name PERDAMAN
Received Date Aug 24, 2020

Client Sample ID			**HA-TP51_0.25**	**HA-TP57_0.25**	**HA-TP57_0.5**	**HA-TP57_0.75**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**P20-Au38825**	**P20-Au38826**	**P20-Au38827**	**P20-Au38828**
Date Sampled			**Aug 19, 2020**	**Aug 19, 2020**	**Aug 19, 2020**	**Aug 19, 2020**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.2	9.2	9.0	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.8	7.8	7.8	7.7
Reaction Ratings*[S05]	-	comment	2.0	2.0	2.0	2.0
% Moisture	1	%	22	9.1	16	21

Client Sample ID			**HA-TP57_1.0**	**BH02_0.25**	**BH27_0.25**
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**P20-Au38829**	**P20-Au38830**	**P20-Au38831**
Date Sampled			**Aug 19, 2020**	**Aug 19, 2020**	**Aug 19, 2020**
Test/Reference	LOR	Unit			
Acid Sulfate Soils Field pH Test					
pH-F (Field pH test)*	0.1	pH Units	8.9	9.0	9.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.8	7.5	7.8
Reaction Ratings*[S05]	-	comment	2.0	3.0	2.0
% Moisture	1	%	21	11	14

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Perth	Aug 25, 2020	7 Days
- Method: LTM-GEN- 7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
% Moisture	Perth	Aug 25, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | Environment Testing

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Company Name: Enveng Group
Address: Unit 3, 19 Caloundra Road
Clarkson
WA 6030

Project Name: PERDAMAN

Order No.:
Report #: 739851
Phone:
Fax:

Received: Aug 24, 2020 11:00 AM
Due: Aug 31, 2020
Priority: 5 Day
Contact Name: Simon French-Bluhm

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736						X	X
Newcastle Laboratory							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	HA-TP51_0.25	Aug 19, 2020		Soil	P20-Au38825	X	X
2	HA-TP57_0.25	Aug 19, 2020		Soil	P20-Au38826	X	X
3	HA-TP57_0.5	Aug 19, 2020		Soil	P20-Au38827	X	X
4	HA-TP57_0.75	Aug 19, 2020		Soil	P20-Au38828	X	X
5	HA-TP57_1.0	Aug 19, 2020		Soil	P20-Au38829	X	X
6	BH02_0.25	Aug 19, 2020		Soil	P20-Au38830	X	X
7	BH27_0.25	Aug 19, 2020		Soil	P20-Au38831	X	X
Test Counts						7	7

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
ug/L: micrograms per litre
ppm: Parts per million
ppb: Parts per billion
%: Percentage
org/100mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Au38826	CP	pH Units	9.2	9.2	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Au38826	CP	pH Units	7.8	7.8	pass	30%	Pass	
Reaction Ratings*	P20-Au38826	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	P20-Au38828	CP	%	21	22	1.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Analytical Services Manager
Senior Analyst-SPOCAS (WA)

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

☐ Sydney Laboratory
Unit F3 Bld F 16 Mars Road Lane Cove West NSW 2066
02 9900 8400 EnviroSampleNSW@eurofins.com

☐ Brisbane Laboratory
Unit 1 21 Smallwood Place Murarrie QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

☐ Perth Laboratory
Unit 2 91 Leach Highway Kewdale WA 6105
08 9251 9600 EnviroSampleWA@eurofins.com

☐ Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175

Company	Enveng Group	Project No		Project Manager	SIMON FRENCH-BLUHM
Address		Project Name	PERDAMAN	EDD Format (ESdat, EQuIS etc)	
Contact Name				Facility Code	
Phone No					
Special Directions					
Purchase Order					
Quote ID No					

Sampler(s)
Handed over by
Email for Invoice
Email for Results

Analyses — Where matrix are repeated, please clearly "Title" or "Filter" during entry to ensure correct results are reported

Containers — Where containers are repeated please clearly "Title" or "Filter" during entry to ensure correct containers are reported

Required Turnaround Time (TAT) — Default will be 5 days if not picked

♦Surcharge will apply
☐ Overnight (reporting by 9am)♦
☐ Same day♦ ☐ 1 day♦
☐ 2 days♦ ☐ 3 days♦
☑ 5 days (Standard)
☐ Other( )

No	Client Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	S4 - ASS pH : Acid Sulfate Soils Field pH Test	X13 - %H2O Set : Moisture Set	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	BH12_0.25	20/08/20	SOIL	X	X								1	
2													1	
3													1	
4													1	
5													1	
6													1	
7													1	
8														
9														
10														
	Add Rows		Total Counts	1	1								7	

Method of Shipment: ☐ Courier (#) ☐ Hand Delivered ☐ Postal — Name — Signature — Date — Time

Laboratory Use Only							
Received By	Caitlyn Gibson	SYD | BNE | MEL | PER | ADL | NTL | DRW	Date		Time	1:30	Temperature 24.8
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Date		Time		Report No 746445

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request.

eurofins | Environment Testing

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 23736

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Enveng Group
Unit 3, 19 Caloundra Road
Clarkson
WA 6030

Attention:

Report	**740445-S**
Project name	PERDAMAN
Received Date	Aug 27, 2020

Client Sample ID			**BH12_0.25**
Sample Matrix			**Soil**
Eurofins Sample No.			**P20-Au44539**
Date Sampled			**Aug 20, 2020**
Test/Reference	LOR	Unit	
Acid Sulfate Soils Field pH Test			
pH-F (Field pH test)*	0.1	pH Units	8.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.8
Reaction Ratings*[S05]	-	comment	4.0
% Moisture	1	%	8.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Perth	Aug 27, 2020	7 Days
- Method: LTM-GEN- 7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
% Moisture	Perth	Aug 27, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name:	Enveng Group	**Order No.:**		**Received:**	Aug 27, 2020 1:30 PM
Address:	Unit 3, 19 Caloundra Road Clarkson WA 6030	**Report #:**	740445	**Due:**	Sep 3, 2020
		Phone:		**Priority:**	5 Day
		Fax:		**Contact Name:**	Simon French-Bluhm
Project Name:	PERDAMAN				

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736						X	X
Newcastle Laboratory							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	BH12_0.25	Aug 20, 2020		Soil	P20-Au44539	X	X
Test Counts						1	1

Internal Quality Control Review and Glossary

General

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6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
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****NOTE:** pH duplicates are reported as a range NOT as RPD

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Terms

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RPD	Relative Percent Difference between two Duplicate pieces of analysis.
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Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
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Results <10 times the LOR : No Limit

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Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

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QC Data General Comments

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5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Au43511	NCP	pH Units	8.5	8.3	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Au43511	NCP	pH Units	7.3	7.3	pass	30%	Pass	
Reaction Ratings*	P20-Au43511	NCP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	P20-Au43511	NCP	%	15	15	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Analytical Services Manager
Senior Analyst-SPOCAS (WA)

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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IANZ # 1290

Company Name: Enveng Group
Address: Unit 3, 19 Caloundra Road
Clarkson
WA 6030

Project Name: PERDAMAN

Order No.:
Report #: 740445
Phone:
Fax:

Received: Aug 27, 2020 1:30 PM
Due: Sep 3, 2020
Priority: 5 Day
Contact Name: Simon French-Bluhm

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736						X	X
Newcastle Laboratory							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	BH12_0.25	Aug 20, 2020		Soil	P20-Au44539	X	X
Test Counts						1	1

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IANZ # 1290

Sample Receipt Advice

Company name:	Enveng Group
Contact name:	Simon French-Bluhm
Project name:	PERDAMAN
Project ID:	Not provided
Turnaround time:	5 Day
Date/Time received	Aug 27, 2020 1:30 PM
Eurofins reference	740445

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✗ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- N/A Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Robert Johnston on phone : or by email: RobertJohnston@eurofins.com

Results will be delivered electronically via email to Simon French-Bluhm - simonfb@enveng-group.com.au.

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#AU06 EnviroSampleWA

From:
Sent: Tuesday, 1 September 2020 9:38 AM
To: #AU06_EnviroSampleWA
Subject: 5 DAY: Perdaman Additional Analysis - COC

ADDITIONAL ANALYSIS – 5 DAY TAT

From: S
Sent: Tuesday, 1 September 2020 8:27
To:
Subject: Perdaman Additional Analysis - COC

EXTERNAL EMAIL*

Morning Rob

Can you please schedule the below samples for SPOCAS and CRS please.

Sample ID	Report ID
HA-TP51_0.25	739851-S
HA-TP57_0.75	739851-S
HA-TP57_1.0	739851-S
BH02_0.25	739851-S
BH27_0.25	739851-S
BH12_0.25	740445-S

Thanks

Director

enveng-group
enveng-group.com.au
Unit 3, 19 Caloundra Rd
Clarkson, WA, 6030
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ENVENG GROUP

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Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name:	Enveng Group
Contact name:	Simon French-Bluhm
Project name:	PERDAMAN
Project ID:	Not provided
Turnaround time:	5 Day
Date/Time received	Sep 1, 2020 8:27 AM
Eurofins reference	741314

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- N/A Sample containers for volatile analysis received with zero headspace.
- ✕ Split sample sent to requested external lab.
- ✕ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Robert Johnston on phone : or by email: RobertJohnston@eurofins.com

Results will be delivered electronically via email to Simon French-Bluhm - simonfb@enveng-group.com.au.

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 23736

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Enveng Group
Unit 3, 19 Caloundra Road
Clarkson
WA 6030

Attention: **Simon French-Bluhm**

Report **741314-S**
Project name PERDAMAN
Received Date Sep 01, 2020

Client Sample ID			**HA-TP51_0.25**	**HA-TP57_0.75**	**HA-TP57_1.0**	**BH02_0.25**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**P20-Se01434**	**P20-Se01435**	**P20-Se01436**	**P20-Se01437**
Date Sampled			**Aug 19, 2020**	**Aug 19, 2020**	**Aug 19, 2020**	**Aug 19, 2020**
Test/Reference	LOR	Unit				
ASS Super Suite (WA)-ANC						
pH-KCL	0.1	pH Units	9.5	9.6	9.6	9.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
pH-OX	0.1	pH Units	8.5	8.0	8.0	8.0
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TPA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Acid trail - Titratable Sulfidic Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TSA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	0.11	0.06	0.07	< 0.02
Sulfur - Peroxide	0.02	% S	0.18	0.17	0.17	0.06
Sulfur - Peroxide Oxidisable Sulfur	0.02	% S	0.07	0.10	0.10	< 0.02
acidity - Peroxide Oxidisable Sulfur	10	mol H+/t	44	64	62	< 10
Calcium - KCl Extractable	0.02	% Ca	0.23	0.17	0.19	0.20
Calcium - Peroxide	0.02	% Ca	13	19	18	10.0
Acid Reacted Calcium	0.02	% Ca	12	19	18	9.8
sulfidic - Acid Reacted Ca equiv. S% pyrite	0.02	% S	9.9	15	15	7.8
acidity - Acid Reacted Calcium	10	mol H+/t	6200	9600	9100	4900
Magnesium - KCl Extractable	0.02	% Mg	0.10	0.06	0.07	0.02
Magnesium - Peroxide	0.02	% Mg	0.75	0.74	0.71	0.24
Acid Reacted Magnesium	0.02	% Mg	0.65	0.68	0.64	0.21
sulfidic - Acid Reacted Mg equiv. S% pyrite	0.02	% S	0.86	0.89	0.84	0.28
acidity - Acid Reacted Magnesium	10	mol H+/t	530	560	520	170
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCE)	0.02	% CaCO3	39	56	53	28
Acid Neutralising Capacity - Acidity units (a-ANCE)	10	mol H+/t	7700	11000	11000	5600
Acid Neutralising Capacity - equivalent S% pyrite(s-ANCE)	0.02	% S	12	18	17	8.9
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	41	70	61	24
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	8300	14000	12000	4700
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	13	22	20	7.6
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5

Client Sample ID			HA-TP51_0.25	HA-TP57_0.75	HA-TP57_1.0	BH02_0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Se01434	P20-Se01435	P20-Se01436	P20-Se01437
Date Sampled			Aug 19, 2020	Aug 19, 2020	Aug 19, 2020	Aug 19, 2020
Test/Reference	LOR	Unit				
ASS Super Suite (WA)-ANC						
SPOCAS - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
SPOCAS - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
SPOCAS - Liming rate	1	kg CaCO3/t	< 1	< 1	< 1	< 1
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	0.02	% S	0.07	0.10	0.10	< 0.02
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	2	mol H+/t	44	64	62	< 2
SPOCAS WA (- ANC) - Liming rate	1	kg CaCO3/t	3.3	4.8	4.6	< 1
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	< 1	< 1	< 1
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO3/t	< 1	< 1	< 1	< 1
<2mm Fraction	0.005	g	50	56	40	52
>2mm Fraction	0.005	g	1.8	< 0.005	3.3	1.8
Analysed Material	0.1	%	97	100	92	97
Extraneous Material	0.1	%	3.4	< 0.1	7.5	3.3
% Moisture	1	%	21	22	20	13

Client Sample ID			BH27_0.25	BH12_0.25
Sample Matrix			Soil	Soil
Eurofins Sample No.			P20-Se01438	P20-Se01439
Date Sampled			Aug 19, 2020	Aug 20, 2020
Test/Reference	LOR	Unit		
ASS Super Suite (WA)-ANC				
pH-KCL	0.1	pH Units	9.3	9.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003
pH-OX	0.1	pH Units	8.4	8.4
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2
sulfidic - TPA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02
Acid trail - Titratable Sulfidic Acidity	2	mol H+/t	< 2	< 2
sulfidic - TSA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	0.03
Sulfur - Peroxide	0.02	% S	0.04	0.08
Sulfur - Peroxide Oxidisable Sulfur	0.02	% S	< 0.02	< 0.02
acidity - Peroxide Oxidisable Sulfur	10	mol H+/t	< 10	< 10
Calcium - KCl Extractable	0.02	% Ca	0.21	0.16
Calcium - Peroxide	0.02	% Ca	9.7	14
Acid Reacted Calcium	0.02	% Ca	9.5	14
sulfidic - Acid Reacted Ca equiv. S% pyrite	0.02	% S	7.6	11
acidity - Acid Reacted Calcium	10	mol H+/t	4700	6800
Magnesium - KCl Extractable	0.02	% Mg	0.02	0.07
Magnesium - Peroxide	0.02	% Mg	0.59	0.86
Acid Reacted Magnesium	0.02	% Mg	0.57	0.79
sulfidic - Acid Reacted Mg equiv. S% pyrite	0.02	% S	0.75	1.0

Client Sample ID			BH27_0.25	BH12_0.25
Sample Matrix			Soil	Soil
Eurofins Sample No.			P20-Se01438	P20-Se01439
Date Sampled			Aug 19, 2020	Aug 20, 2020
Test/Reference	LOR	Unit		
ASS Super Suite (WA)-ANC				
acidity - Acid Reacted Magnesium	10	mol H+/t	470	650
HCl Extractable Sulfur	0.02	% S	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	n/a
Acid Neutralising Capacity (ANCE)	0.02	% CaCO3	29	41
Acid Neutralising Capacity - Acidity units (a-ANCE)	10	mol H+/t	5700	8200
Acid Neutralising Capacity - equivalent S% pyrite(s-ANCE)	0.02	% S	9.2	13
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	31	47
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	6100	9300
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	9.8	15
ANC Fineness Factor		factor	1.5	1.5
SPOCAS - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02
SPOCAS - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10
SPOCAS - Liming rate	1	kg CaCO3/t	< 1	< 1
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	0.02	% S	< 0.02	< 0.02
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	2	mol H+/t	< 2	< 2
SPOCAS WA (- ANC) - Liming rate	1	kg CaCO3/t	< 1	< 1
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	< 1
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO3/t	< 1	< 1
<2mm Fraction	0.005	g	46	53
>2mm Fraction	0.005	g	< 0.005	3.9
Analysed Material	0.1	%	100	93
Extraneous Material	0.1	%	< 0.1	6.9
% Moisture	1	%	12	8.7

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
ASS Super Suite (WA)-ANC	Brisbane	Sep 02, 2020	0 Days
- Method: LTM-GEN-7050 Suspension Peroxide Oxidation Combined Acidity and Sulfur (SPOCAS)			
% Moisture	Perth	Sep 01, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

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Phone : 0800 856 450
IANZ # 1290

Company Name: Enveng Group
Address: Unit 3, 19 Caloundra Road
Clarkson
WA 6030

Project Name: PERDAMAN

Order No.:
Report #: 741314
Phone:
Fax:

Received: Sep 1, 2020 8:27 AM
Due: Sep 8, 2020
Priority: 5 Day
Contact Name: Simon French-Bluhm

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Moisture Set	ASS Super Suite (WA)-ANC
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							X
Perth Laboratory - NATA Site # 23736						X	
Newcastle Laboratory							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	HA-TP51_0.25	Aug 19, 2020		Soil	P20-Se01434	X	X
2	HA-TP57_0.75	Aug 19, 2020		Soil	P20-Se01435	X	X
3	HA-TP57_1.0	Aug 19, 2020		Soil	P20-Se01436	X	X
4	BH02_0.25	Aug 19, 2020		Soil	P20-Se01437	X	X
5	BH27_0.25	Aug 19, 2020		Soil	P20-Se01438	X	X
6	BH12_0.25	Aug 20, 2020		Soil	P20-Se01439	X	X
Test Counts						6	6

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
ug/L: micrograms per litre
ppm: Parts per million
ppb: Parts per billion
%: Percentage
org/100mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
ASS Super Suite (WA)-ANC									
pH-KCL			%	100			80-120	Pass	
Acid trail - Titratable Actual Acidity			%	100			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
ASS Super Suite (WA)-ANC				Result 1	Result 2	RPD			
pH-KCL	P20-Se01434	CP	pH Units	9.5	9.5	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P20-Se01434	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P20-Se01434	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
pH-OX	P20-Se01434	CP	pH Units	8.5	8.3	2.0	30%	Pass	
Acid trail - Titratable Peroxide Acidity	P20-Se01434	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TPA equiv. S% pyrite	P20-Se01434	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Acid trail - Titratable Sulfidic Acidity	P20-Se01434	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TSA equiv. S% pyrite	P20-Se01434	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P20-Se01434	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	P20-Se01434	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	P20-Se01434	CP	% S	0.11	0.11	<1	30%	Pass	
Sulfur - Peroxide	P20-Se01434	CP	% S	0.18	0.18	3.0	30%	Pass	
Sulfur - Peroxide Oxidisable Sulfur	P20-Se01434	CP	% S	0.07	0.08	6.0	30%	Pass	
acidity - Peroxide Oxidisable Sulfur	P20-Se01434	CP	mol H+/t	44	47	6.0	30%	Pass	
Calcium - KCl Extractable	P20-Se01434	CP	% Ca	0.23	0.23	<1	30%	Pass	
Calcium - Peroxide	P20-Se01434	CP	% Ca	13	13	5.0	30%	Pass	
Acid Reacted Calcium	P20-Se01434	CP	% Ca	12	13	5.0	30%	Pass	
sulfidic - Acid Reacted Ca equiv. S% pyrite	P20-Se01434	CP	% S	9.9	10	5.0	30%	Pass	
acidity - Acid Reacted Calcium	P20-Se01434	CP	mol H+/t	6200	6500	5.0	30%	Pass	
Magnesium - KCl Extractable	P20-Se01434	CP	% Mg	0.10	0.10	<1	30%	Pass	
Magnesium - Peroxide	P20-Se01434	CP	% Mg	0.75	0.77	3.0	30%	Pass	
Acid Reacted Magnesium	P20-Se01434	CP	% Mg	0.65	0.67	4.0	30%	Pass	
sulfidic - Acid Reacted Mg equiv. S% pyrite	P20-Se01434	CP	% S	0.86	0.89	4.0	30%	Pass	
acidity - Acid Reacted Magnesium	P20-Se01434	CP	mol H+/t	530	550	4.0	30%	Pass	
Net Acid soluble sulfur	P20-Se01434	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	P20-Se01434	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	P20-Se01434	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCE)	P20-Se01434	CP	% CaCO3	39	38	1.0	30%	Pass	
Acid Neutralising Capacity - Acidity units (a-ANCE)	P20-Se01434	CP	mol H+/t	7700	7600	1.0	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P20-Se01434	CP	% CaCO3	41	42	1.0	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P20-Se01434	CP	% S	13	13	1.0	30%	Pass	
ANC Fineness Factor	P20-Se01434	CP	factor	1.5	1.5	<1	30%	Pass	
SPOCAS - Net Acidity (Sulfur Units)	P20-Se01434	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
SPOCAS - Net Acidity (Acidity Units)	P20-Se01434	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
SPOCAS - Liming rate	P20-Se01434	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	P20-Se01434	CP	% S	0.07	0.08	6.0	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
ASS Super Suite (WA)-ANC				Result 1	Result 2	RPD			
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	P20-Se01434	CP	mol H+/t	44	47	6.0	30%	Pass	
SPOCAS WA (- ANC) - Liming rate	P20-Se01434	CP	kg CaCO3/t	3.3	3.6	6.0	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	P20-Se01434	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	P20-Se01434	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate	P20-Se01434	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	P20-Se01434	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	P20-Se01434	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS suite WA (-ANC) - Liming Rate	P20-Se01434	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	P20-Au47426	NCP	%	13	12	6.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

Authorised By

Analytical Services Manager
Senior Analyst-SPOCAS (QLD)

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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10 September 2020

Clough
Level 9, Alluvion
58 Mounts bay Road
Perth, 6000

Enveng Group Project No. PR25

Dear Phil,

Re: Perdaman Environmental Testing and Acid Sulfate Soils (ASS) Preliminary Assessment - Summary of Findings and Recommendations

Summary

This Report has been prepared by Enveng Group in accordance with the scope of services discussed in the Contract letter between Clough and Enveng Group in relation to the Perdaman Urea Project ASS Geotechnical Assessment carried out by Coffey. The soil samples were analysed by Eurofins Laboratory and this report aims to succinctly summarise this data on behalf of Clough.

The purpose of the geotechnical investigation and subsequent data analysis was to determine whether the soil profile in the area of project excavations contain Actual Acid Sulfate Soil (AASS) or Potential Acid Sulfate Soil (PASS), which may be exposed to air as a result of Project construction. Based on the data received and reviewed, the risk of encountering ASS during the excavations and works proposed is minimal. Based on the data, Enveng Group does not consider there to be a requirement to treat or manage ASS during construction.

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. This report is not considered to be an ASS investigation report as per Appendix C of the Department of Water and Environmental Regulations' (DWER) Identification and investigation of acid sulfate soils and acidic landscapes (June 2015). This report is to inform Clough of potential construction and cost implications associated with Acid Sulfate Soils based on the Preliminary Geotechnical investigation carried out by Coffey and the associated Laboratory results.

Scope of Works

The scope of works carried out by Enveng Group comprise:

- Review of the field data borehole and test pit logs and photography provided by Coffey;
- Review of lab analysis results by Eurofins;
- Assessment and discussion of results received and subsequent determination of the risk of encountering ASS during construction activities proposed; and,
- An interpretive report displaying results, assessment, risks and recommendations.

Following a review of the documents supporting the Public Environmental Review, Enveng Group overlaid the Acid Sulfate Soils Risk Map (DWER-053) using the National Map Database

(refer figure 1). Figure 1 clearly identifies (red shading) a high to moderate risk of encountering ASS within 3m of the ground surface to the south of Site "C" and the proposed causeway. The results for samples taken at locations presented in Table 1 will be discussed in this report.

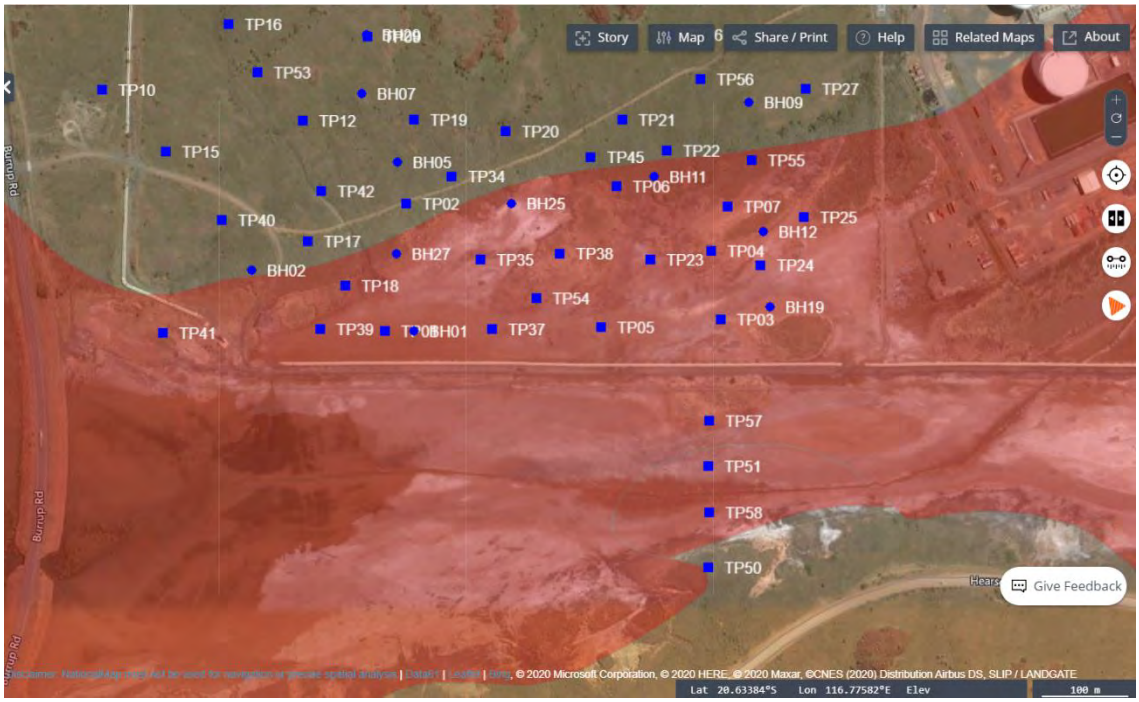

Figure 1 - Pilbara ASS Risk Map showing proposed Geotech locations

ASS Assessment Criteria

The Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes guideline (DWER 2015a) established action criteria for the assessment of environmental risk of ASS. The action criteria are based on the net acidity excluding ANC which is the sum of existing and potential acidity calculated as equivalent sulfur (e.g. s-TAA + SPOS in %S units).

As clay content tends to influence the soil's natural buffering capacity, the action criteria are grouped by three (3) broad categories – coarse, medium, and fine. The criteria are used to determine when disturbance of ASS will require treatment and management.

The proposed construction requires disturbance of greater than 1000 tonnes of material, the guidelines (DWER 2015a) define an equivalent acidity of 0.03 %S to be used as the action criteria in this assessment. In addition to the action criteria, the guidelines (DWER 2015a) define indicator pH values for pH_F and pH_{FOX} to assist in characterising likely acid generating soils.

The pH indicator values are defined as:

- pH_F <4 pH units oxidation of sulphides probably occurred in the past, indicates presence of AASS.
- pH_{FOX} <3 pH units and a significant reaction rate – strongly indicates PASS.
- a significantly lower pH_{FOX} value than the pH_F value is used as an indicative trigger value in this assessment, i.e. pH_F – pH_{FOX} >1.0 pH unit.

Field Sampling

At the time of preparing this report, Enveng Group had not been provided with intrusive investigation field logs to review. Refer to the Coffey Report (doc reference TBA), for fieldwork and sampling methodology.

Table 1 represents the samples submitted by Coffey to Eurofins for lab analysis. A total of 30 samples where received by the laboratory. No duplicates or quality control samples were submitted.

Sample Id	Sample Depth (m)	Number of Samples Collected
TP-18	0.25, 0.50, 0.75, 1.00	4
TP-38	0.25, 0.50, 0.75	3
TP24, TP58	0.25, 0.50, 0.75, 1.00	8
TP50	0.25, 0.5	2
HA-TP51	0.25	1
HA- TP57	0.25, 0.50, 0.75, 1.00	4
TTP03	0.25, 0.50, 0.75, 1.00, 1.25	5
BH02, BH27, BH12	0.25	3

Table 1 – Soil Samples submitted to Laboratory for testing of AASS and PASS indicators

Acid Sulfate Soil Laboratory Testing and Results

Representative samples of soil were recovered from the site investigation carried out by Coffey and delivered to Eurofins in Perth, a NATA accredited Laboratory for ASS testing. The following analysis were scheduled.

- 30 primary samples for pH_F and pH_{FOX} analysis
- 18 primary samples for Chromium Reducible Sulfur Suite (CRS) and Suspension Peroxide Oxidation Combined Acidity and Sulfur (SPOCAS)

The results from the laboratory reports have been summarised by Enveng Group and presented in Attachment 1. Associated Chain of Custody (CoC), Certificates of Analysis (CoAs) and Quality Control reports are provided in Attachment 2.

pH Screening Results (in-lab)

Preliminary pH screening tests provide important information in regard to the existing acidity of each soil profile (pH_F) and the stored (potential) acidity of the soil.

The pH field screening method is indicative only and cannot determine the presence or absence of ASS. The pH field screen may provide 'false positives' and 'false negatives' therefore overestimating or underestimating the true acidity potential of a soil.

The results of the ASS pH screening are summarised below and presented in Attachment 1.

- pH_F ranged from 8.8 to 9.8 with an average of 9.2.
- pH_{FOX} ranged from 7.1 to 9.0 with an average of 7.9.
- The ΔpH, defined as pH_F minus pH_{FOX}, ranged from 0.4 to 1.9.

The field screening results indicate that the soils sampled were basic. The observed reaction rates when subject to peroxide digest were inconsistent across the investigated site ranging from Low to Extreme.

SPOCAS and Scr Results

SPOCAS and Scr analysis following the pH field screening review. While none of the samples met the field screening for additional analysis, a conservative risk adverse approach to ASS was taken and eighteen samples scheduled regardless.

The results are summarised and presented in Table 2 below:

- Laboratory pH_{KCL} and pH_{OX} are in the range of 8.8 – 9.7 and 6.4 – 8.5 respectively.
- Titratable Actual Acidity (TAA) was not recorded above the limits of reporting (LoR) of 0.003% S.
- Titratable Peroxide Acidity (TPA) was not recorded above the LoR of 0.003% S.
- Titratable Sulfidic Acidity (TSA) was not recorded above the LoR of 0.02% S.
- Peroxide Oxidisable Sulfur (SPOS) was recorded above the LoR and assessment criteria of 0.03% S in five samples.
- Net Acidity was not recorded above the LoR of 0.02% S.
- Acid Neutralising Capacity (ANC) ranged from 0.28% S to 56% S.
- Scr was not reported above the LoR of 0.02% S.

Field Observations	SPOCAS						S_{CR} Suite	
	TAA	TPA	TSA	SPOS	ANCE	Net Acidity*	S_{CR}	Net Acidity (S_{CR})
Unit	**% S**	**% S**	**% S**	**% S**	**% S**	**% S**	**% S**	**% S**
Assessment Criteria	**0.03**	**0.03**		**0.03**			**0.03**	**0.03**
Location								
TP18-0.75	< 0.003	< 0.02	< 0.02	**0.08**	13	< 0.02	< 0.02	< 0.02
TP18-1.0	< 0.003	< 0.02	< 0.02	< 0.02	9.3	< 0.02	< 0.02	< 0.02
TP38-0.25	< 0.003	< 0.02	< 0.02	< 0.02	1.7	< 0.02	< 0.02	< 0.02
TP38-0.50	< 0.003	< 0.02	< 0.02	< 0.02	1.7	< 0.02	< 0.02	< 0.02
TP03_0.25	< 0.003	< 0.02	< 0.02	**0.06**	13	< 0.02	< 0.02	< 0.02
TP03_1.0	< 0.003	< 0.02	< 0.02	< 0.02	10	< 0.02	< 0.02	< 0.02
TP24_0.5	< 0.003	< 0.02	< 0.02	< 0.02	15	< 0.02	< 0.02	< 0.02
TP24_0.75	< 0.003	< 0.02	< 0.02	< 0.02	18	< 0.02	< 0.02	< 0.02
TP50_0.25	< 0.003	< 0.02	< 0.02	< 0.02	0.28	< 0.02	< 0.02	< 0.02
TP50_0.5	< 0.003	< 0.02	< 0.02	< 0.02	n/a	< 0.02	< 0.02	< 0.02
TP58_0.75	< 0.003	< 0.02	< 0.02	< 0.02	6.8	< 0.02	< 0.02	< 0.02
TP58_1.0	< 0.003	< 0.02	< 0.02	< 0.02	8.3	< 0.02	< 0.02	< 0.02
HA-TP51_0.25	< 0.003	< 0.02	< 0.02	**0.07**	39	< 0.02	< 0.02	< 0.02
HA-TP57_0.75	< 0.003	< 0.02	< 0.02	**0.1**	56	< 0.02	< 0.02	< 0.02
HA-TP57_1.0	< 0.003	< 0.02	< 0.02	**0.1**	53	< 0.02	< 0.02	< 0.02

BH02_0.25	< 0.003	< 0.02	< 0.02	< 0.02	28	< 0.02	< 0.02	< 0.02
BH27_0.25	< 0.003	< 0.02	< 0.02	< 0.02	29	< 0.02	< 0.02	< 0.02
BH12_0.25	< 0.003	< 0.02	< 0.02	< 0.02	41	< 0.02	< 0.02	< 0.02

Table 2 SPOCAS and S_{CR} Results

Discussion on Results

Other than the SPOS exceeding the assessment criteria of 0.03% S in five samples, the corresponding data from the Scr analysis did not report % S above the LoR.

It should be noted that SPOS gives a measure of the maximum 'oxidisable' sulfur (usually predominantly sulfides) present in the soil sample. Since the chemical oxidising conditions employed in the laboratory are more rigorous than those experienced in the field, the SPOS result may, as a consequence, include some of the sulfur from the organic fraction in soil layers with appreciable organic matter. In such soil samples, SPOS is often slightly greater than chromium reducible sulfur (SCR) (which specifically excludes organic forms of sulfur). Generally, SCR and SPOS results are well correlated for redox-reduced or PASS samples but may differ on partially oxidised and surface samples.

Therefore, the exceedances for the SPOS in these five samples can be attributed to organic forms of sulfur and the assessment should rather take into consideration the Scr results.

On this basis, **samples are not considered to contain AASS or PASS** and will not require treatment (liming for neutralization).

Quality Assurance/Control

The following QA/QC program was implemented.

Procedure	Controls and Strategy
Record Keeping By Coffey	Detailed records of all field activities including, sample collection and soil description has been maintained via field logging and completion of scope appropriate field. (TBC)
Sample Labelling By Coffey	Sampling containers were clearly labelled with a solvent free permanent marker at the time of collection with the following details. Job Reference Unique sample identification Depth of sample Date of sample Initials of sampler.
Chain of Custody	Chain of custody (CoC) were prepared following lab receipt of samples.
Sample Collection and Storage By Coffey	500g Soil samples were transferred into suitable approved sampling containers (as supplied by the nominated laboratory) and placed in pre chilled storage containers prior to being transferred in cool storage to the laboratory. Samples were submitted to TOLL for priority delivery direct to Eurofins.
Decontamination By Coffey	Refer to Coffey Report (TBA)
QA/QC Samples By Coffey	Field QA/QC samples were not submitted to the Laboratory by Coffey
Laboratory Internal QA/QC	The Eurofins laboratory adopted a QA/QC program endorsed by NATA completed using NATA accredited laboratories and associated NATA accredited methods Eurofins has applied internal standards to check the consistency of the analytical processes (e.g. injection volumes, instrument sensitivity and retention times for

	chromatographic systems). Sample splits and method validation processes are also utilised as part of the laboratories internal QA/QC procedures. Laboratory QA/QC will be undertaken in accordance with the Schedule B(3) of the National Environmental Protection Measure 1999.
Laboratory QA/QC results	Laboratory QA/QC results are provided in the laboratory documentation.

Table 3 - QA/QC Protocols

Risk Assessment

In order to evaluate environmental risk, Enveng Group adopts a conceptual site model that uses the source-pathway-receptor process.

Following the review of factual data obtained from the geotechnical engineers, the soils are not considered to contain AASS or PASS and therefore the source is absent in the model. Consequently, linkages cannot be completed, and the result is negligible risk of ASS on the project.

Conclusion and Recommendations

The data interpreted by Enveng Group indicate that ASS is not likely present based on the results from the locations sampled and tested (as shown in Table 1). The net acidity under the S_{CR} and SPOCAS method was identical. The results for both SPOCAS and S_{CR} Method of the net acidity being under the adopted assessment criteria threshold of 0.03% for all 18 samples indicates **no presence of AASS or PASS** (presented in Table 2 and 3). On this basis, samples are not considered to contain AASS or PASS and will not require liming for neutralization and therefore at this stage Enveng Group does not consider there to be a requirement to treat ASS during construction. This assessment does not include dewatering activities.

Enveng Group concludes that the preparation of an ASSMP may not be necessary for Clough to undertake their Scope of Works on the Perdaman Urea Project. However, as the Acid Sulfate Soils Risk Map identifies the southern portion of Site C as high to moderate risk, there is a possibility that the preparation and submission of an ASSMP to DWER may be a Ministerial Condition of the Environmental Approvals.

Enveng Group does recommend that Clough include basic soil management protocols or controls within an overall environmental management plan for the Project with a focus on highlighting visual markers of PASS / AASS during excavations and or dewatering activities.

Should you need to discuss the above or require any clarification, please do not hesitate to call. We thank you for engaging Enveng Group and look forward to working with Clough again.

Kind Regards,

Director

Attachment 1 – Field Summary Results
Attachment 2 – Lab Data
Attachment 3 – Limitations

Attachment 1

Field Observations					Field Test				Lab pH		SPOCAS						S_{CR} Suite	
Location	Depth (mBGL) From	Depth (mBGL) To	Soil Description	Depth to Water	Moisture	pHF	pHFOX	Delta pH	Reaction Rate	pH kcl	pH OX	TAA	TPA	TSA	SPOS	ANCE	Net Acidity*	S_{CR}	Net Acidity (S_{CR})
				mBGL	%	pH Units	pH Units	pH Units	-	pH units	pH units	%S	%S	%S	%S	%S	%S	%S	%S
Assessment Criteria				-		4	4	1				0.03	0.03		0.03			0.03	0.03
Lab Report: 737826										Lab Report: 739074									
TP18-0.25		0.25			5	9.2	7.9	1.3	L	-	-	-	-	-	-	-	-	-	-
TP18-0.50		0.5			7.2	9.3	7.9	1.4	L	-	-	-	-	-	-	-	-	-	-
TP18-0.75		0.75			11	9.2	7.9	1.3	M	9.7	8	< 0.003	< 0.02	< 0.02	**0.08**	13	< 0.02	< 0.02	< 0.02
TP18-1.0		1			19	9.2	7.9	1.3	M	9.6	8	< 0.003	< 0.02	< 0.02	< 0.02	9.3	< 0.02	< 0.02	< 0.02
TP38-0.25		0.25			8.8	9.7	8.1	1.6	L	9.4	7.8	< 0.003	< 0.02	< 0.02	< 0.02	1.7	< 0.02	< 0.02	< 0.02
TP38-0.50		0.5			12	9.7	8.3	1.4	L	9.5	8	< 0.003	< 0.02	< 0.02	< 0.02	3.2	< 0.02	< 0.02	< 0.02
TP38-0.75		0.75			15	9.7	8.1	1.6	L	-	-	-	-	-	-	-	-	-	-
Lab Report: 738493										Lab Report: 739074									
TP03_0.25		0.25			13	8.9	7.9	1	S	9.5	8.3	< 0.003	< 0.02	< 0.02	**0.06**	13	< 0.02	< 0.02	< 0.02
TP03_0.5		0.5			20	9.3	7.8	1.5	M	-	-	-	-	-	-	-	-	-	-
TP03_0.75		0.75			19	9.5	7.8	1.7	L	-	-	-	-	-	-	-	-	-	-
TP03_1.0		1			14	9.2	7.8	1.4	M	9.5	8	< 0.003	< 0.02	< 0.02	< 0.02	10	< 0.02	< 0.02	< 0.02
TP03_1.25		1.25			11	9.5	7.8	1.7	M	-	-	-	-	-	-	-	-	-	-
TP24_0.25		0.25			19	9.8	7.9	1.9	M	-	-	-	-	-	-	-	-	-	-
TP24_0.5		0.5			22	9	7.8	1.2	M	9.5	8.1	< 0.003	< 0.02	< 0.02	< 0.02	15	< 0.02	< 0.02	< 0.02
TP24_0.75		0.75			14	9.6	7.9	1.7	M	9.7	7.9	< 0.003	< 0.02	< 0.02	< 0.02	18	< 0.02	< 0.02	< 0.02
TP24_1.0		1			21	9.1	7.7	1.4	M	-	-	-	-	-	-	-	-	-	-
TP50_0.25		0.25			5.5	9	7.1	1.9	X	8.9	6.6	< 0.003	< 0.02	< 0.02	< 0.02	0.28	< 0.02	< 0.02	< 0.02
TP50_0.5		0.5			6.1	9	7.4	1.6	X	8.8	6.4	< 0.003	< 0.02	< 0.02	< 0.02	n/a	< 0.02	< 0.02	< 0.02
TP58_0.25		0.25			17	9.1	7.9	1.2	M	-	-	-	-	-	-	-	-	-	-
TP58_0.5		0.5			15	9.4	9	0.4	M	-	-	-	-	-	-	-	-	-	-
TP58_0.75		0.75			13	9.3	7.8	1.5	M	9.5	8.2	< 0.003	< 0.02	< 0.02	< 0.02	6.8	< 0.02	< 0.02	< 0.02
TP58_1.0		1			15	9.3	7.9	1.4	M	9.5	7.9	< 0.003	< 0.02	< 0.02	< 0.02	8.3	< 0.02	< 0.02	< 0.02
Lab Report: 739851										Lab Report: 741314									
HA-TP51_0.25		0.25			22	9.2	7.8	1.4	M	9.5	8.5	< 0.003	< 0.02	< 0.02	**0.07**	39	< 0.02	< 0.02	< 0.02
HA-TP57_0.25		0.25			9.1	9.2	7.8	1.4	M	-	-	-	-	-	-	-	-	-	-
HA-TP57_0.5		0.5			16	9	7.8	1.2	M	-	-	-	-	-	-	-	-	-	-
HA-TP57_0.75		0.75			21	8.8	7.7	1.1	M	9.6	8	< 0.003	< 0.02	< 0.02	**0.1**	56	< 0.02	< 0.02	< 0.02
HA-TP57_1.0		1			21	8.9	7.8	1.1	M	9.6	8	< 0.003	< 0.02	< 0.02	**0.1**	53	< 0.02	< 0.02	< 0.02
BH02_0.25		0.25			11	9	7.5	1.5	S	9.3	8	< 0.003	< 0.02	< 0.02	< 0.02	28	< 0.02	< 0.02	< 0.02
BH27_0.25		0.25			14	9.2	7.8	1.4	M	9.3	8.4	< 0.003	< 0.02	< 0.02	< 0.02	29	< 0.02	< 0.02	< 0.02
Lab Report: 740445										Lab Report: 741314									
BH12_0.25		0.25			8.1	8.9	7.8	1.1	X	9.4	8.4	< 0.003	< 0.02	< 0.02	< 0.02	41	< 0.02	< 0.02	< 0.02

Attachment 2 – Lab Reports

Attachment 3 - Limitations

This report has been prepared on the basis of information provided by Coffey and from publicly available literature, which has not been independently verified or checked beyond the agreed scope of work. Enveng Group does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on reviewed factual data at the date of preparation of the report. Enveng Group has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

APPENDIX J: LABORATORY DOCUMENTS

DRAFT

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201691**	Page	: 1 of 31
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 724-PEREN295751 PERDAMAN	Date Samples Received	: 14-Feb-2022 13:40
Order number	: ----	Date Analysis Commenced	: 14-Feb-2022
C-O-C number	: ----	Issue Date	: 22-Feb-2022 14:55
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 19		
No. of samples analysed	: 19		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X and EP262 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP262 :Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.
- EP262: Matrix spike recovery not determined due to dilution requirement.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG035F-LL: LOR raised for Hg on sample 005, 009, 014 and 019 due to high TDS content.
- EG020: Metals LOR for sample EP2201691 -005,-009,-14, -018 and -019 raised due to high TDS content.
- EP262: ALS is not NATA accredited for the analysis of MDEA.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW01	MW04	MW05	MW06	MW08
			Sampling date / time	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-001	EP2201691-002	EP2201691-003	EP2201691-004	EP2201691-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.52	----	----	----	7.50
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	12500	----	----	----	162000
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	7800	----	----	----	139000
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	463	----	----	----	131
Total Alkalinity as CaCO3	----	1	mg/L	463	----	----	----	131
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	53	----	----	----	45
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	14	----	----	----	8050
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	3860	----	----	----	70700
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	350	----	----	----	1500
Magnesium	7439-95-4	1	mg/L	335	----	----	----	4870
Sodium	7440-23-5	1	mg/L	1740	----	----	----	42500
Potassium	7440-09-7	1	mg/L	25	----	----	----	1540
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	----	----	----	<0.20
Arsenic	7440-38-2	0.001	mg/L	0.005	----	0.003	0.001	<0.020
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	<0.0001	0.0002	<0.0020
Chromium	7440-47-3	0.001	mg/L	<0.001	----	<0.001	<0.001	<0.020
Copper	7440-50-8	0.001	mg/L	<0.001	----	<0.001	<0.001	<0.020
Nickel	7440-02-0	0.001	mg/L	0.003	----	0.003	0.005	<0.020
Lead	7439-92-1	0.001	mg/L	<0.001	----	<0.001	<0.001	<0.020
Zinc	7440-66-6	0.005	mg/L	<0.005	----	<0.005	0.035	<0.100
Manganese	7439-96-5	0.001	mg/L	17.4	----	----	----	0.390
Iron	7439-89-6	0.05	mg/L	15.8	----	----	----	<1.00
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	<0.00004	----	<0.00004	<0.00004	<0.00020

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW01	MW04	MW05	MW06	MW08
			Sampling date / time	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-001	EP2201691-002	EP2201691-003	EP2201691-004	EP2201691-005
				Result	Result	Result	Result	Result
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	----	<0.01	9.19	0.74
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	----	----	<0.01	0.63	0.06
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	----	----	<0.01	0.20	5.48
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	<0.01	0.83	5.54
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	0.5	11.1	4.0
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	----	----	0.5	11.9	9.5
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	----	----	0.08	0.06	0.85
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	118	----	----	----	2160
ø Total Cations	----	0.01	meq/L	121	----	----	----	2360
ø Ionic Balance	----	0.01	%	1.22	----	----	----	4.40
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	----	<1	<1	<1	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	----	<0.5	<0.5	<0.5	----
beta-BHC	319-85-7	0.5	µg/L	----	<0.5	<0.5	<0.5	----
gamma-BHC	58-89-9	0.5	µg/L	----	<0.5	<0.5	<0.5	----
delta-BHC	319-86-8	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Heptachlor	76-44-8	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Aldrin	309-00-2	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	----	<0.5	<0.5	<0.5	----
trans-Chlordane	5103-74-2	0.5	µg/L	----	<0.5	<0.5	<0.5	----
alpha-Endosulfan	959-98-8	0.5	µg/L	----	<0.5	<0.5	<0.5	----
cis-Chlordane	5103-71-9	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Dieldrin	60-57-1	0.5	µg/L	----	<0.5	<0.5	<0.5	----
4.4`-DDE	72-55-9	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Endrin	72-20-8	0.5	µg/L	----	<0.5	<0.5	<0.5	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW01	MW04	MW05	MW06	MW08
			Sampling date / time	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-001	EP2201691-002	EP2201691-003	EP2201691-004	EP2201691-005
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-Endosulfan	33213-65-9	0.5	µg/L	----	<0.5	<0.5	<0.5	----
4.4`-DDD	72-54-8	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Endrin aldehyde	7421-93-4	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	----	<0.5	<0.5	<0.5	----
4.4`-DDT	50-29-3	2.0	µg/L	----	<2.0	<2.0	<2.0	----
Endrin ketone	53494-70-5	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Methoxychlor	72-43-5	2.0	µg/L	----	<2.0	<2.0	<2.0	----
^ Total Chlordane (sum)	----	0.5	µg/L	----	<0.5	<0.5	<0.5	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	----	<0.5	<0.5	<0.5	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	----	<0.5	<0.5	<0.5	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Demeton-S-methyl	919-86-8	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Monocrotophos	6923-22-4	2.0	µg/L	----	<2.0	<2.0	<2.0	----
Dimethoate	60-51-5	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Diazinon	333-41-5	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Parathion-methyl	298-00-0	2.0	µg/L	----	<2.0	<2.0	<2.0	----
Malathion	121-75-5	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Fenthion	55-38-9	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Chlorpyrifos	2921-88-2	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Parathion	56-38-2	2.0	µg/L	----	<2.0	<2.0	<2.0	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Chlorfenvinphos	470-90-6	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Fenamiphos	22224-92-6	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Prothiofos	34643-46-4	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Ethion	563-12-2	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Carbophenothion	786-19-6	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Azinphos Methyl	86-50-0	0.5	µg/L	----	<0.5	<0.5	<0.5	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	----	----	<1.0	<1.0	<1.0

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW01	MW04	MW05	MW06	MW08
			Sampling date / time	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-001	EP2201691-002	EP2201691-003	EP2201691-004	EP2201691-005
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	----	----	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	----	----	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	----	----	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	----	----	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	----	----	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	----	----	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	----	----	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	----	----	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	----	----	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	----	----	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	----	----	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	----	----	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	----	----	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	----	----	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	----	----	<100	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	----	----	<1	<1	<1
Toluene	108-88-3	2	µg/L	----	----	<2	<2	<2

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW01	MW04	MW05	MW06	MW08
			Sampling date / time	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-001	EP2201691-002	EP2201691-003	EP2201691-004	EP2201691-005
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
Ethylbenzene	100-41-4	2	µg/L	----	----	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	----	----	<2	<2	<2
^ Total Xylenes	----	2	µg/L	----	----	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	----	----	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	----	----	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	**0.0101**	----	<0.0005	<0.0005	**0.0057**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	----	**0.0011**	**0.0006**	**0.0024**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	**0.0044**	----	**0.0045**	**0.0033**	**0.0013**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	----	<0.0020	**0.0435**	**0.0383**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	----	**0.0012**	<0.0005	**0.0603**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	----	**0.0018**	**0.0010**	**0.0239**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	----	**0.0038**	**0.0019**	**0.0349**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	**0.0023**	----	**0.0028**	**0.0102**	**0.0048**
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	**0.0007**	----	**0.0027**	**0.0052**	**0.0015**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	----	**0.0012**	**0.0038**	<0.0005
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	----	<0.0005	**0.0006**	<0.0005
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW01	MW04	MW05	MW06	MW08
			Sampling date / time	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-001	EP2201691-002	EP2201691-003	EP2201691-004	EP2201691-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	----	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	----	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	----	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	----	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	----	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	**0.004**	----	**0.007**	**0.005**	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	**0.001**	----	<0.001	**0.001**	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	----	<0.001	<0.001	<0.001
EP231P: PFAS Sums								
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	**0.0044**	----	**0.0056**	**0.0039**	**0.0037**
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	**0.0218**	----	**0.0222**	**0.0665**	**0.172**
^ Sum of PFAS	----	0.0002	µg/L	**0.0225**	----	**0.0261**	**0.0761**	**0.173**
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	----	----	----	----	<10
Diethanolamine	111-42-2	1	µg/L	----	----	----	----	<10
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	----	----	----	----	<10
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW01	MW04	MW05	MW06	MW08
			Sampling date / time	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-001	EP2201691-002	EP2201691-003	EP2201691-004	EP2201691-005
				Result	Result	Result	Result	Result
EP066S: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	1	%	----	57.4	48.8	73.9	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	----	78.8	144	97.0	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	----	63.2	88.4	83.8	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	----	----	34.3	29.4	54.6
2-Chlorophenol-D4	93951-73-6	1.0	%	----	----	75.4	66.0	78.2
2.4.6-Tribromophenol	118-79-6	1.0	%	----	----	55.2	60.7	114
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	----	----	86.5	74.8	85.0
Anthracene-d10	1719-06-8	1.0	%	----	----	112	85.6	98.5
4-Terphenyl-d14	1718-51-0	1.0	%	----	----	109	84.8	112
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	----	----	95.3	113	98.9
Toluene-D8	2037-26-5	2	%	----	----	106	99.0	103
4-Bromofluorobenzene	460-00-4	2	%	----	----	107	118	113
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	96.3	----	98.4	94.7	95.1
13C8-PFOA	----	0.0005	%	119	----	101	118	106

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW010	BH22	BH31	BH12	QC01
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-006	EP2201691-007	EP2201691-008	EP2201691-009	EP2201691-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.31	7.76	----	7.20	8.36
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	8930	6680	----	180000	9010
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	5160	4820	----	166000	5010
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	<1	8
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	344	563	----	105	340
Total Alkalinity as CaCO3	----	1	mg/L	344	563	----	105	348
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	<1	32	----	53	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	342	87	----	6500	339
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	2590	2060	----	84900	2570
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	30	169	----	1440	29
Magnesium	7439-95-4	1	mg/L	88	172	----	5260	89
Sodium	7440-23-5	1	mg/L	1690	1120	----	48400	1700
Potassium	7440-09-7	1	mg/L	94	53	----	1800	94
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.02	0.05	----	<0.20	0.02
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.004	0.002	<0.020	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0020	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.020	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.010	<0.020	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	0.004	0.028	<0.020	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.020	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	0.009	0.008	<0.100	<0.005
Manganese	7439-96-5	0.001	mg/L	<0.001	5.74	----	14.5	0.001
Iron	7439-89-6	0.05	mg/L	<0.05	5.39	----	8.39	<0.05
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	<0.00004	<0.00004	<0.00004	<0.00020	<0.00004

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW010	BH22	BH31	BH12	QC01
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-006	EP2201691-007	EP2201691-008	EP2201691-009	EP2201691-010
				Result	Result	Result	Result	Result
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	3.73	0.13	0.74	0.09
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	9.16	0.02	<0.01	<0.01	9.17
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	9.17	0.02	<0.01	<0.01	9.17
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.6	61.1	63.0	2.4	0.6
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	9.8	61.1	63.0	2.4	9.8
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.02	0.28	0.86	0.06	0.02
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	87.0	71.2	----	2530	86.5
ø Total Cations	----	0.01	meq/L	84.6	72.7	----	2660	85.1
ø Ionic Balance	----	0.01	%	1.40	1.04	----	2.38	0.81
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	----	----	<1	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	----	----	<0.5	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	----	----	<0.5	----	----
beta-BHC	319-85-7	0.5	µg/L	----	----	<0.5	----	----
gamma-BHC	58-89-9	0.5	µg/L	----	----	<0.5	----	----
delta-BHC	319-86-8	0.5	µg/L	----	----	<0.5	----	----
Heptachlor	76-44-8	0.5	µg/L	----	----	<0.5	----	----
Aldrin	309-00-2	0.5	µg/L	----	----	<0.5	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	----	----	<0.5	----	----
trans-Chlordane	5103-74-2	0.5	µg/L	----	----	<0.5	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L	----	----	<0.5	----	----
cis-Chlordane	5103-71-9	0.5	µg/L	----	----	<0.5	----	----
Dieldrin	60-57-1	0.5	µg/L	----	----	<0.5	----	----
4.4`-DDE	72-55-9	0.5	µg/L	----	----	<0.5	----	----
Endrin	72-20-8	0.5	µg/L	----	----	<0.5	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW010	BH22	BH31	BH12	QC01
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-006	EP2201691-007	EP2201691-008	EP2201691-009	EP2201691-010
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-Endosulfan	33213-65-9	0.5	µg/L	----	----	<0.5	----	----
4.4`-DDD	72-54-8	0.5	µg/L	----	----	<0.5	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	----	----	<0.5	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	----	----	<0.5	----	----
4.4`-DDT	50-29-3	2.0	µg/L	----	----	<2.0	----	----
Endrin ketone	53494-70-5	0.5	µg/L	----	----	<0.5	----	----
Methoxychlor	72-43-5	2.0	µg/L	----	----	<2.0	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	----	----	<0.5	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	----	----	<0.5	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	----	----	<0.5	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	----	----	<0.5	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	----	----	<0.5	----	----
Monocrotophos	6923-22-4	2.0	µg/L	----	----	<2.0	----	----
Dimethoate	60-51-5	0.5	µg/L	----	----	<0.5	----	----
Diazinon	333-41-5	0.5	µg/L	----	----	<0.5	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	----	----	<0.5	----	----
Parathion-methyl	298-00-0	2.0	µg/L	----	----	<2.0	----	----
Malathion	121-75-5	0.5	µg/L	----	----	<0.5	----	----
Fenthion	55-38-9	0.5	µg/L	----	----	<0.5	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	----	----	<0.5	----	----
Parathion	56-38-2	2.0	µg/L	----	----	<2.0	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	----	----	<0.5	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	----	----	<0.5	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	----	----	<0.5	----	----
Fenamiphos	22224-92-6	0.5	µg/L	----	----	<0.5	----	----
Prothiofos	34643-46-4	0.5	µg/L	----	----	<0.5	----	----
Ethion	563-12-2	0.5	µg/L	----	----	<0.5	----	----
Carbophenothion	786-19-6	0.5	µg/L	----	----	<0.5	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	----	----	<0.5	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW010	BH22	BH31	BH12	QC01
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-006	EP2201691-007	EP2201691-008	EP2201691-009	EP2201691-010
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	**50**	**9220**	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	**240**	**2940**	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	**290**	**12200**	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	**11600**	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	**220**	**270**	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	**220**	**11900**	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	**11600**	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW010	BH22	BH31	BH12	QC01
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-006	EP2201691-007	EP2201691-008	EP2201691-009	EP2201691-010
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	**0.0113**	**0.0416**	**0.512**	**0.0188**	**0.0114**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	**0.368**	**0.256**	**0.0086**	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	**0.0011**	**2.37**	**1.29**	**0.126**	**0.0011**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	**0.0614**	**0.0720**	**0.0039**	<0.0005
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	**0.0017**	**0.726**	**0.595**	**0.0898**	**0.0016**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	**0.0752**	**0.207**	**0.0768**	**0.0143**	**0.0782**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	**0.140**	**0.425**	**0.346**	**0.0180**	**0.142**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	**0.137**	**0.271**	**0.209**	**0.0095**	**0.138**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	**0.122**	**0.933**	**0.839**	**0.0296**	**0.112**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	**0.0734**	**0.232**	**0.186**	**0.0108**	**0.0712**
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	**0.0226**	**0.0131**	**0.0098**	**0.0012**	**0.0210**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	**0.0006**	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW010	BH22	BH31	BH12	QC01
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-006	EP2201691-007	EP2201691-008	EP2201691-009	EP2201691-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	**0.0006**	<0.0005	<0.0005	<0.0005
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	**0.002**	**0.002**	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	**0.432**	**0.464**	**0.025**	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	**0.003**	**0.005**	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
EP231P: PFAS Sums								
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	**0.0028**	**3.10**	**1.88**	**0.216**	**0.0027**
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	**0.562**	**5.64**	**4.52**	**0.342**	**0.556**
^ Sum of PFAS	----	0.0002	µg/L	**0.584**	**6.09**	**4.86**	**0.356**	**0.576**
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<10	<10	----	<10	<10
Diethanolamine	111-42-2	1	µg/L	<10	<10	----	<10	<10
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<10	<10	----	<10	<10
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW010	BH22	BH31	BH12	QC01
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-006	EP2201691-007	EP2201691-008	EP2201691-009	EP2201691-010
				Result	Result	Result	Result	Result
EP066S: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	1	%	----	----	63.3	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	----	----	111	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	----	----	39.7	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	31.3	26.3	35.8	53.7	23.8
2-Chlorophenol-D4	93951-73-6	1.0	%	69.2	58.8	82.0	72.0	51.8
2.4.6-Tribromophenol	118-79-6	1.0	%	57.9	120	131	105	40.1
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	77.1	71.4	60.9	76.2	59.2
Anthracene-d10	1719-06-8	1.0	%	95.5	92.2	93.3	89.3	73.9
4-Terphenyl-d14	1718-51-0	1.0	%	100	87.9	82.1	94.1	80.8
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	79.9	96.3	95.5	97.7	92.3
Toluene-D8	2037-26-5	2	%	104	88.2	95.2	98.1	96.4
4-Bromofluorobenzene	460-00-4	2	%	112	113	112	110	110
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	99.7	67.3	96.0	113	97.7
13C8-PFOA	----	0.0005	%	102	113	106	114	104

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC03	QC04	QC05	QC06	QC08
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-011	EP2201691-012	EP2201691-013	EP2201691-014	EP2201691-015
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	----	----	----	**7.52**	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	----	----	**145000**	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	**130000**	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	----	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	----	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	----	**120**	----
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	**120**	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	----	----	----	**35**	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	**7740**	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	----	----	----	**68800**	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	----	----	**1460**	----
Magnesium	7439-95-4	1	mg/L	----	----	----	**4530**	----
Sodium	7440-23-5	1	mg/L	----	----	----	**39800**	----
Potassium	7440-09-7	1	mg/L	----	----	----	**1460**	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	----	----	----	<0.20	----
Arsenic	7440-38-2	0.001	mg/L	----	----	----	<0.020	----
Cadmium	7440-43-9	0.0001	mg/L	----	----	----	<0.0020	----
Chromium	7440-47-3	0.001	mg/L	----	----	----	<0.020	----
Copper	7440-50-8	0.001	mg/L	----	----	----	<0.020	----
Nickel	7440-02-0	0.001	mg/L	----	----	----	<0.020	----
Lead	7439-92-1	0.001	mg/L	----	----	----	<0.020	----
Zinc	7440-66-6	0.005	mg/L	----	----	----	<0.100	----
Manganese	7439-96-5	0.001	mg/L	----	----	----	**0.069**	----
Iron	7439-89-6	0.05	mg/L	----	----	----	<1.00	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	----	----	----	<0.00020	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC03	QC04	QC05	QC06	QC08
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-011	EP2201691-012	EP2201691-013	EP2201691-014	EP2201691-015
				Result	Result	Result	Result	Result
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	----	----	0.55	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	----	----	----	0.02	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	----	----	----	6.20	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	----	6.22	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	----	2.0	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	----	----	----	8.2	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	----	----	----	0.08	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	----	----	----	2100	----
ø Total Cations	----	0.01	meq/L	----	----	----	2210	----
ø Ionic Balance	----	0.01	%	----	----	----	2.54	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	----	----	<1	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	----	----	<0.5	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	----	----	<0.5	----	----
beta-BHC	319-85-7	0.5	µg/L	----	----	<0.5	----	----
gamma-BHC	58-89-9	0.5	µg/L	----	----	<0.5	----	----
delta-BHC	319-86-8	0.5	µg/L	----	----	<0.5	----	----
Heptachlor	76-44-8	0.5	µg/L	----	----	<0.5	----	----
Aldrin	309-00-2	0.5	µg/L	----	----	<0.5	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	----	----	<0.5	----	----
trans-Chlordane	5103-74-2	0.5	µg/L	----	----	<0.5	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L	----	----	<0.5	----	----
cis-Chlordane	5103-71-9	0.5	µg/L	----	----	<0.5	----	----
Dieldrin	60-57-1	0.5	µg/L	----	----	<0.5	----	----
4.4`-DDE	72-55-9	0.5	µg/L	----	----	<0.5	----	----
Endrin	72-20-8	0.5	µg/L	----	----	<0.5	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC03	QC04	QC05	QC06	QC08
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-011	EP2201691-012	EP2201691-013	EP2201691-014	EP2201691-015
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-Endosulfan	33213-65-9	0.5	µg/L	----	----	<0.5	----	----
4.4`-DDD	72-54-8	0.5	µg/L	----	----	<0.5	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	----	----	<0.5	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	----	----	<0.5	----	----
4.4`-DDT	50-29-3	2.0	µg/L	----	----	<2.0	----	----
Endrin ketone	53494-70-5	0.5	µg/L	----	----	<0.5	----	----
Methoxychlor	72-43-5	2.0	µg/L	----	----	<2.0	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	----	----	<0.5	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	----	----	<0.5	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	----	----	<0.5	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	----	----	<0.5	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	----	----	<0.5	----	----
Monocrotophos	6923-22-4	2.0	µg/L	----	----	<2.0	----	----
Dimethoate	60-51-5	0.5	µg/L	----	----	<0.5	----	----
Diazinon	333-41-5	0.5	µg/L	----	----	<0.5	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	----	----	<0.5	----	----
Parathion-methyl	298-00-0	2.0	µg/L	----	----	<2.0	----	----
Malathion	121-75-5	0.5	µg/L	----	----	<0.5	----	----
Fenthion	55-38-9	0.5	µg/L	----	----	<0.5	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	----	----	<0.5	----	----
Parathion	56-38-2	2.0	µg/L	----	----	<2.0	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	----	----	<0.5	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	----	----	<0.5	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	----	----	<0.5	----	----
Fenamiphos	22224-92-6	0.5	µg/L	----	----	<0.5	----	----
Prothiofos	34643-46-4	0.5	µg/L	----	----	<0.5	----	----
Ethion	563-12-2	0.5	µg/L	----	----	<0.5	----	----
Carbophenothion	786-19-6	0.5	µg/L	----	----	<0.5	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	----	----	<0.5	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC03	QC04	QC05	QC06	QC08
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-011	EP2201691-012	EP2201691-013	EP2201691-014	EP2201691-015
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	----	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	----	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	----	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	----	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	----	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	----	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	<100	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	----	<2	<2	<2

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC03	QC04	QC05	QC06	QC08
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-011	EP2201691-012	EP2201691-013	EP2201691-014	EP2201691-015
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
Ethylbenzene	100-41-4	2	µg/L	<2	----	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	----	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	----	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	----	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	----	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	----	<0.0005	<0.0005	**0.0015**	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	----	<0.0005	<0.0005	**0.0017**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	----	<0.0002	<0.0002	**0.0012**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	----	<0.0020	<0.0020	**0.0196**	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	----	<0.0005	<0.0005	**0.0411**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	----	<0.0005	<0.0005	**0.0071**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	----	<0.0005	<0.0005	**0.0170**	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	----	<0.0005	<0.0005	**0.0017**	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	----	<0.0005	<0.0005	**0.0009**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC03	QC04	QC05	QC06	QC08
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-011	EP2201691-012	EP2201691-013	EP2201691-014	EP2201691-015
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	----	<0.001	<0.001	<0.001	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	----	<0.001	<0.001	<0.001	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	----	<0.001	<0.001	<0.001	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	----	<0.001	<0.001	<0.001	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	----	<0.001	<0.001	<0.001	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	----	<0.001	<0.001	<0.001	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	----	<0.001	<0.001	<0.001	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	----	<0.001	<0.001	<0.001	----
EP231P: PFAS Sums								
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	----	<0.0002	<0.0002	**0.0029**	----
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	----	<0.0002	<0.0002	**0.0909**	----
^ Sum of PFAS	----	0.0002	µg/L	----	<0.0002	<0.0002	**0.0918**	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	----	----	<10	<10	----
Diethanolamine	111-42-2	1	µg/L	----	----	<10	<10	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	----	----	<10	<10	----
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC03	QC04	QC05	QC06	QC08
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-011	EP2201691-012	EP2201691-013	EP2201691-014	EP2201691-015
				Result	Result	Result	Result	Result
EP066S: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	1	%	----	----	34.2	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	----	----	136	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	----	----	63.3	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	24.7	----	26.4	60.1	29.3
2-Chlorophenol-D4	93951-73-6	1.0	%	59.2	----	62.5	85.3	44.3
2.4.6-Tribromophenol	118-79-6	1.0	%	58.6	----	15.1	85.7	54.8
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	67.7	----	62.3	97.3	74.9
Anthracene-d10	1719-06-8	1.0	%	76.4	----	63.7	101	86.8
4-Terphenyl-d14	1718-51-0	1.0	%	76.2	----	59.1	101	88.3
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	96.3	----	94.9	91.5	95.7
Toluene-D8	2037-26-5	2	%	101	----	99.6	105	100
4-Bromofluorobenzene	460-00-4	2	%	112	----	109	107	110
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	----	94.5	99.1	93.7	----
13C8-PFOA	----	0.0005	%	----	101	93.2	97.8	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC09	TBW46	MW07-2	MW08-2	----
			Sampling date / time	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201691-016	EP2201691-017	EP2201691-018	EP2201691-019	--------
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	----	----	----	7.53	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	----	----	143000	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	143000	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	----	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	----	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	----	122	----
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	122	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	----	----	----	34	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	7670	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	----	----	----	67200	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	----	----	1500	----
Magnesium	7439-95-4	1	mg/L	----	----	----	4460	----
Sodium	7440-23-5	1	mg/L	----	----	----	40000	----
Potassium	7440-09-7	1	mg/L	----	----	----	1540	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	----	----	----	<0.20	----
Arsenic	7440-38-2	0.001	mg/L	----	----	<0.020	<0.020	----
Cadmium	7440-43-9	0.0001	mg/L	----	----	<0.0020	<0.0020	----
Chromium	7440-47-3	0.001	mg/L	----	----	<0.020	<0.020	----
Copper	7440-50-8	0.001	mg/L	----	----	<0.020	<0.020	----
Nickel	7440-02-0	0.001	mg/L	----	----	<0.020	<0.020	----
Lead	7439-92-1	0.001	mg/L	----	----	<0.020	<0.020	----
Zinc	7440-66-6	0.005	mg/L	----	----	<0.100	<0.100	----
Manganese	7439-96-5	0.001	mg/L	----	----	----	0.069	----
Iron	7439-89-6	0.05	mg/L	----	----	----	<1.00	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	----	----	<0.00004	<0.00020	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC09	TBW46	MW07-2	MW08-2	----
			Sampling date / time	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201691-016	EP2201691-017	EP2201691-018	EP2201691-019	--------
				Result	Result	Result	Result	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	----	----	0.55	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	----	----	----	0.03	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	----	----	----	6.13	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	----	6.16	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	----	2.2	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	----	----	----	8.4	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	----	----	----	0.10	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	----	----	----	2060	----
ø Total Cations	----	0.01	meq/L	----	----	----	2220	----
ø Ionic Balance	----	0.01	%	----	----	----	3.82	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	<1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	<0.5	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	----	----	----	----
beta-BHC	319-85-7	0.5	µg/L	<0.5	----	----	----	----
gamma-BHC	58-89-9	0.5	µg/L	<0.5	----	----	----	----
delta-BHC	319-86-8	0.5	µg/L	<0.5	----	----	----	----
Heptachlor	76-44-8	0.5	µg/L	<0.5	----	----	----	----
Aldrin	309-00-2	0.5	µg/L	<0.5	----	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	----	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	----	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	----	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	----	----	----	----
Dieldrin	60-57-1	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDE	72-55-9	0.5	µg/L	<0.5	----	----	----	----
Endrin	72-20-8	0.5	µg/L	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC09	TBW46	MW07-2	MW08-2	----
			Sampling date / time	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201691-016	EP2201691-017	EP2201691-018	EP2201691-019	--------
				Result	Result	Result	Result	----
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDD	72-54-8	0.5	µg/L	<0.5	----	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	----	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDT	50-29-3	2.0	µg/L	<2.0	----	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	----	----	----	----
Methoxychlor	72-43-5	2.0	µg/L	<2.0	----	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	<0.5	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	----	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	----	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	----	----	----	----
Dimethoate	60-51-5	0.5	µg/L	<0.5	----	----	----	----
Diazinon	333-41-5	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	----	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	----	----	----	----
Malathion	121-75-5	0.5	µg/L	<0.5	----	----	----	----
Fenthion	55-38-9	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	----	----	----	----
Parathion	56-38-2	2.0	µg/L	<2.0	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	----	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	----	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	----	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	----	----	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	----	----	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	----	----	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	----	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	<1.0	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	<1.0	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	<1.0	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC09	TBW46	MW07-2	MW08-2	----
			Sampling date / time	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201691-016	EP2201691-017	EP2201691-018	EP2201691-019	--------
				Result	Result	Result	Result	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	<1.0	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	<1.0	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	<1.0	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	<1.0	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	<1.0	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	<1.0	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	<1.0	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	<1.0	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	<0.5	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	<20	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	<50	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	<100	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	<20	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	<20	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	<100	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	<100	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	<100	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	<100	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	<1	----
Toluene	108-88-3	2	µg/L	<2	----	----	<2	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC09	TBW46	MW07-2	MW08-2	----
			Sampling date / time	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201691-016	EP2201691-017	EP2201691-018	EP2201691-019	--------
				Result	Result	Result	Result	----
EP080: BTEXN - Continued								
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	<2	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	<2	----
^ Total Xylenes	----	2	µg/L	<2	----	----	<2	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	<1	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	<5	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	**0.0011**	**0.0014**	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	**0.0006**	**0.0017**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	**0.0009**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	**0.0306**	**0.0171**	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	**0.0223**	**0.0250**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	**0.0064**	**0.0071**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	**0.0130**	**0.0132**	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	**0.0016**	**0.0013**	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC09	TBW46	MW07-2	MW08-2	----
			Sampling date / time	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201691-016	EP2201691-017	EP2201691-018	EP2201691-019	--------
				Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
EP231P: PFAS Sums								
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	<0.0002	**0.0006**	**0.0026**	----
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	**0.0756**	**0.0677**	----
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	**0.0756**	**0.0677**	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<10	----	<10	<10	----
Diethanolamine	111-42-2	1	µg/L	<10	----	<10	<10	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<10	----	<10	<10	----
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC09	TBW46	MW07-2	MW08-2	----
			Sampling date / time	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201691-016	EP2201691-017	EP2201691-018	EP2201691-019	--------
				Result	Result	Result	Result	----
EP066S: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	1	%	72.1	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	88.5	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	53.4	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	52.1	----	----	45.0	----
2-Chlorophenol-D4	93951-73-6	1.0	%	50.2	----	----	75.8	----
2.4.6-Tribromophenol	118-79-6	1.0	%	61.8	----	----	121	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	64.0	----	----	99.4	----
Anthracene-d10	1719-06-8	1.0	%	90.7	----	----	99.0	----
4-Terphenyl-d14	1718-51-0	1.0	%	88.5	----	----	110	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	106	----	----	98.8	----
Toluene-D8	2037-26-5	2	%	99.3	----	----	111	----
4-Bromofluorobenzene	460-00-4	2	%	111	----	----	112	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	98.7	101	96.6	95.1	----
13C8-PFOA	----	0.0005	%	96.2	94.8	105	92.9	----

Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	27	136
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	50	146
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	27	153
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	67
2-Chlorophenol-D4	93951-73-6	29	120
2.4.6-Tribromophenol	118-79-6	10	131
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	34	131
Anthracene-d10	1719-06-8	43	126
4-Terphenyl-d14	1718-51-0	41	142
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

(WATER) EP262: Ethanolamines

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2201691**	Page	: 1 of 16
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 724-PEREN295751 PERDAMAN	Date Samples Received	: 14-Feb-2022
Order number	: ----	Date Analysis Commenced	: 14-Feb-2022
C-O-C number	: ----	Issue Date	: 22-Feb-2022
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 19		
No. of samples analysed	: 19		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 4174042)									
EP2201675-017	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.67	7.69	0.3	0% - 20%
EP2201675-027	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	9.05	9.09	0.4	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 4174045)									
EP2201691-009	BH12	EA005-P: pH Value	----	0.01	pH Unit	7.20	7.23	0.4	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4174043)									
EP2201675-017	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	59100	59500	0.6	0% - 20%
EP2201675-027	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	50000	49900	0.2	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4174046)									
EP2201691-009	BH12	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	180000	184000	1.9	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 4175700)									
EP2201486-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	334	334	0.3	0% - 20%
EP2201524-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	4950	4910	0.9	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 4175714)									
EP2201545-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	174	170	2.0	0% - 50%
EP2201592-007	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	485	514	5.9	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4174041)									
EP2201675-017	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	164	163	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	164	163	0.0	0% - 20%
EP2201675-027	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	81	86	6.3	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	16	14	17.8	0% - 50%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
ED037P: Alkalinity by PC Titrator (QC Lot: 4174041) - continued									
EP2201675-027	Anonymous	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	97	100	2.6	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4174044)									
EP2201691-009	BH12	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	105	95	10.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	105	95	10.6	0% - 20%
ED038A: Acidity (QC Lot: 4175730)									
EP2201666-001	Anonymous	ED038: Acidity as CaCO3	----	1	mg/L	5	6	0.0	No Limit
EP2201666-006	Anonymous	ED038: Acidity as CaCO3	----	1	mg/L	19	12	45.2	0% - 50%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4172297)									
EP2201691-006	MW010	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	342	341	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4177535)									
EP2201691-001	MW01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	14	14	0.0	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 4172296)									
EP2201691-006	MW010	ED045G: Chloride	16887-00-6	1	mg/L	2590	2550	1.3	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4177536)									
EP2201691-001	MW01	ED045G: Chloride	16887-00-6	1	mg/L	3860	3860	0.1	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4176289)									
EP2201732-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	15	16	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	16	16	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	48	47	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	5	5	0.0	No Limit
EP2201732-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	12	11	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	10	10	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	66	66	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4176286)									
EP2201678-003	Anonymous	EG020A-F: Iron	7439-89-6	0.05	mg/L	3.95	4.00	1.2	0% - 20%
EP2201678-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0012	0.0011	0.0	0% - 50%
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.026	0.026	0.0	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	2.99	3.03	1.2	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.087	0.086	0.0	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.034	0.033	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP2201732-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4176286) - continued									
EP2201732-003	Anonymous	EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.002	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.48	0.49	0.0	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.16	0.15	9.2	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 4173491)									
EP2201668-033	Anonymous	EG035F-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00020	<0.00020	0.0	No Limit
EP2201691-014	QC06	EG035F-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00020	<0.00020	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 4172298)									
EP2201691-004	MW06	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	9.19	9.20	0.1	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4172295)									
EP2201691-019	MW08-2	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.03	0.03	0.0	No Limit
EP2201691-006	MW010	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.01	0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4172299)									
EP2201691-004	MW06	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.83	0.83	0.0	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4173758)									
EP2201673-007	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.2	2.1	4.8	0% - 50%
EP2201691-006	MW010	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.6	0.6	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4173759)									
EP2201673-007	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.07	0.06	0.0	No Limit
EP2201691-006	MW010	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.02	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4175774)									
EP2201691-010	QC01	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4175774) - continued									
EP2201691-010	QC01	EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4175773)									
EP2201691-010	QC01	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4178502)									
EP2201691-003	MW05	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP2201691-014	QC06	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4175773)									
EP2201691-010	QC01	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4178502)									
EP2201691-003	MW05	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP2201691-014	QC06	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 4178502)									
EP2201691-003	MW05	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP2201691-014	QC06	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4177758)									
EP2201691-010	QC01	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0016	0.0017	7.6	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4177758) - continued									
EP2201691-010	QC01	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0114	0.0122	7.2	0% - 20%
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0011	0.0010	0.0	No Limit
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
EP2201691-016	QC09	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0	No Limit
		EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4177758)									
EP2201691-010	QC01	EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.142	0.139	2.1	0% - 20%
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.112	0.124	10.1	0% - 20%
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.138	0.148	6.5	0% - 20%
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0712	0.0752	5.5	0% - 20%
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	0.0210	0.0222	5.5	0% - 20%
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	0.0782	0.0772	1.3	0% - 20%
EP2201691-016	QC09	EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4177758) - continued									
EP2201691-016	QC09	EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	<0.0020	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4177758)									
EP2201691-010	QC01	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit
EP2201691-016	QC09	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4177758)									

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4177758) - continued									
EP2201691-010	QC01	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	0.0	No Limit
EP2201691-016	QC09	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4177758)									
EP2201691-010	QC01	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0027	0.0027	0.0	0% - 50%
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.556	0.578	4.0	0% - 20%
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.576	0.600	4.1	0% - 20%
EP2201691-016	QC09	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0	No Limit
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	0.0	No Limit
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	0.0	No Limit
EP262: Ethanolamines (QC Lot: 4179764)									
EP2201691-010	QC01	EP262: Ethanolamine	141-43-5	1	µg/L	<10	<10	0.0	No Limit
		EP262: Diethanolamine	111-42-2	1	µg/L	<10	<10	0.0	No Limit
		EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<10	<10	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 4174042)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA005P: pH by PC Titrator (QCLot: 4174045)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	99.8	98.5	102
EA010P: Conductivity by PC Titrator (QCLot: 4174043)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	24800 µS/cm	99.8	92.1	105
EA010P: Conductivity by PC Titrator (QCLot: 4174046)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	24800 µS/cm	101	92.1	105
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 4175700)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	104	88.1	114
				<10	1000 mg/L	100	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 4175714)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	107	88.1	114
				<10	1000 mg/L	99.0	88.1	114
ED037P: Alkalinity by PC Titrator (QCLot: 4174041)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	105	81.2	126
				<1	200 mg/L	103	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 4174044)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	110	81.2	126
				<1	200 mg/L	104	90.0	110
ED038A: Acidity (QCLot: 4175730)								
ED038: Acidity as CaCO3	----	----	mg/L	----	19.5 mg/L	122	83.6	128
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4172297)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	87.7	113
				<1	500 mg/L	99.0	87.7	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4177535)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	87.7	113
				<1	500 mg/L	99.9	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 4172296)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	104	87.9	114
				<1	1000 mg/L	106	87.9	114
ED045G: Chloride by Discrete Analyser (QCLot: 4177536)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.9	87.9	114
				<1	1000 mg/L	103	87.9	114
ED093F: Dissolved Major Cations (QCLot: 4176289)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	109	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	103	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	100	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	101	89.7	108
EG020F: Dissolved Metals by ICP-MS (QCLot: 4176286)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	103	84.0	120
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	84.0	120
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	101	86.0	120
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	100	85.0	120
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.1	84.0	120
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.8	85.0	120
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.5	85.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.6	84.0	120
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	89.0	120
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	115	84.0	120
EG035F: Dissolved Mercury by FIMS (QCLot: 4173491)								
EG035F-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00004	0.01 mg/L	99.7	87.6	115
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4172298)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	95.7	86.2	111
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4172295)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	101	88.7	113
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4172299)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	100	90.5	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4173758)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	91.6	75.8	100
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4173759)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	99.7	70.0	110
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4175771)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4175771) - continued								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	5 µg/L	82.0	36.2	90.2
EP068A: Organochlorine Pesticides (OC) (QCLot: 4175772)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	92.8	42.3	112
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	79.7	39.0	108
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	99.2	45.5	116
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	102	43.0	118
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	102	46.2	115
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	64.2	39.0	111
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	101	39.7	114
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	114	42.4	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	114	43.6	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	92.1	42.1	129
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	103	42.7	123
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	81.9	42.4	121
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	87.3	43.8	123
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	101	26.9	127
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	94.8	44.9	128
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	119	41.7	128
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	82.4	32.2	121
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	68.3	40.7	120
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	103	31.6	123
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	83.7	36.4	124
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	92.0	25.4	124
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4175772)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	81.7	38.8	110
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	92.0	34.6	115
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	7.8	0	20.1
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	82.9	27.8	102
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	105	46.1	122
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	62.1	46.6	118
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	89.6	26.8	110
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	82.3	38.8	119
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	84.6	45.0	119
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	90.1	44.6	118
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	81.1	30.2	112
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	116	43.2	123
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	106	41.1	119
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	96.2	34.4	125
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	82.7	19.9	123

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4175772) - continued								
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	110	38.0	121
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	92.2	39.5	121
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	73.4	39.7	119
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	15.8	0	137
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4175774)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	49.6	41.9	99.1
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	55.5	36.1	113
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	55.5	35.8	102
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	59.5	33.5	113
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	64.9	36.5	115
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	64.6	46.4	109
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	72.3	40.4	124
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	70.7	40.2	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	67.5	40.2	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	68.6	45.6	121
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	10 µg/L	66.6	43.2	123
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	67.2	47.3	121
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	66.4	44.8	123
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	63.7	38.8	120
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	64.6	39.4	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	64.8	40.1	123
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4175773)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	368 µg/L	67.8	39.3	103
EP071: C15 - C28 Fraction	----	100	µg/L	<100	369 µg/L	71.1	47.2	122
EP071: C29 - C36 Fraction	----	50	µg/L	<50	297 µg/L	56.1	42.5	119
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4178502)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	93.6	73.6	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4175773)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	370 µg/L	66.3	42.0	104
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	482 µg/L	66.1	46.2	116
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	283 µg/L	52.8	24.7	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4178502)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	97.8	73.9	115
EP080: BTEXN (QCLot: 4178502)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	88.2	84.1	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	95.5	81.0	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080: BTEXN (QCLot: 4178502) - continued								
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	94.5	84.4	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	112	84.3	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	105	86.5	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	79.8	77.0	118
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4177758)								
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	104	72.0	130
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	107	71.0	127
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	100	68.0	131
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	106	69.0	134
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	83.6	65.0	140
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	83.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4177758)								
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	101	73.0	129
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	96.0	72.0	129
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	118	72.0	129
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	90.4	72.0	130
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	92.4	71.0	133
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	96.0	69.0	130
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	80.4	71.0	129
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	99.6	69.0	133
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	107	72.0	134
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	79.6	65.0	144
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	110	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4177758)								
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	91.6	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	102	68.0	141
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	87.7	56.6	136
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	93.8	61.9	129
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	85.1	52.8	135
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	91.6	65.0	136
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	110	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4177758)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4177758) - continued								
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	95.2	63.0	143
EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.004 µg/L	97.2	64.0	140
EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.004 µg/L	114	67.0	138
EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	0.004 µg/L	78.0	60.9	136
EP231P: PFAS Sums (QCLot: 4177758)								
EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	----	----	----	----
EP262: Ethanolamines (QCLot: 4179764)								
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	93.0	50.0	130
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	89.5	50.0	130
EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	10 µg/L	92.1	50.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4172297)							
EP2201691-005	MW08	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4177535)							
EP2201691-001	MW01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	103	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4172296)							
EP2201691-005	MW08	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4177536)							
EP2201691-001	MW01	ED045G: Chloride	16887-00-6	1000 mg/L	101	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4176286)							
EP2201691-001	MW01	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	104	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	102	70.0	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	97.5	70.0	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	95.9	70.0	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	92.9	70.0	130

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4176286) - continued							
EP2201691-001	MW01	EG020A-F: Manganese	7439-96-5	0.2 mg/L	# Not Determined	70.0	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	99.8	70.0	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	96.3	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4173491)							
EP2201691-001	MW01	EG035F-LL: Mercury	7439-97-6	0.01 mg/L	84.8	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4172298)							
EP2201691-003	MW05	EK055G: Ammonia as N	7664-41-7	1 mg/L	98.9	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4172295)							
EP2201691-003	MW05	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	83.6	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4172299)							
EP2201691-003	MW05	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	99.0	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4173758)							
EP2201673-008	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	97.8	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4173759)							
EP2201673-008	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	102	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4175773)							
EP2201691-014	QC06	EP071: C10 - C14 Fraction	----	368 µg/L	114	44.5	122
		EP071: C15 - C28 Fraction	----	369 µg/L	138	55.1	143
		EP071: C29 - C36 Fraction	----	297 µg/L	96.3	53.6	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4178502)							
EP2201691-004	MW06	EP080: C6 - C9 Fraction	----	240 µg/L	77.6	77.0	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4175773)							
EP2201691-014	QC06	EP071: >C10 - C16 Fraction	----	370 µg/L	118	44.5	122
		EP071: >C16 - C34 Fraction	----	482 µg/L	121	55.1	143
		EP071: >C34 - C40 Fraction	----	283 µg/L	89.4	53.6	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4178502)							
EP2201691-004	MW06	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	77.0	77.0	137
EP080: BTEXN (QCLot: 4178502)							
EP2201691-004	MW06	EP080: Benzene	71-43-2	20 µg/L	84.5	77.0	122
		EP080: Toluene	108-88-3	20 µg/L	98.1	73.5	126
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4177758)							
EP2201691-014	QC06	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 µg/L	110	72.0	130
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	89.2	71.0	127
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	86.0	68.0	131

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4177758) - continued							
EP2201691-014	QC06	EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	101	69.0	134
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	100	65.0	140
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	72.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4177758)							
EP2201691-014	QC06	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	109	73.0	129
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	# Not Determined	72.0	129
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	# Not Determined	72.0	129
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 µg/L	103	72.0	130
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 µg/L	100	71.0	133
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 µg/L	72.0	69.0	130
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 µg/L	75.2	71.0	129
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	96.8	69.0	133
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	115	72.0	134
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.004 µg/L	74.4	65.0	144
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 µg/L	97.8	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4177758)							
EP2201691-014	QC06	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.004 µg/L	92.0	67.0	137
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.01 µg/L	110	68.0	141
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.01 µg/L	89.9	56.6	136
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.01 µg/L	71.7	61.9	129
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.01 µg/L	76.6	52.8	135
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 µg/L	96.4	65.0	136
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 µg/L	102	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4177758)							
EP2201691-014	QC06	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	108	63.0	143
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 µg/L	82.8	64.0	140
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 µg/L	93.2	67.0	138
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 µg/L	73.6	60.9	136

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201691**	Page	: 1 of 17
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 724-PEREN295751 PERDAMAN	Date Samples Received	: 14-Feb-2022
Site	: ----	Issue Date	: 22-Feb-2022
Sampler	: Nick Taylor	No. of samples received	: 19
Order number	: ----	No. of samples analysed	: 19

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2201691--005	MW08	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2201691--005	MW08	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	EP2201691--001	MW01	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2201691--014	QC06	**Perfluoropentanoic acid (PFPeA)**	2706-90-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2201691--014	QC06	**Perfluorohexanoic acid (PFHxA)**	307-24-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
MW01, MW010, BH12,	MW08, BH22, QC01	----	----	----	15-Feb-2022	09-Feb-2022	**6**
Clear Plastic Bottle - Natural							
QC06,	MW08-2	----	----	----	15-Feb-2022	10-Feb-2022	**5**
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Natural							
MW08, BH22, QC01	MW010, BH12,	----	----	----	14-Feb-2022	10-Feb-2022	**4**
Clear Plastic Bottle - Natural							
MW05, BH31, MW08-2	MW06, QC06,	----	----	----	14-Feb-2022	11-Feb-2022	**3**
EK057G: Nitrite as N by Discrete Analyser							

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EK057G: Nitrite as N by Discrete Analyser - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural MW08, MW010, BH22, BH12, QC01	----	----	----	14-Feb-2022	11-Feb-2022	**3**
Clear Plastic Bottle - Natural MW05, MW06, BH31, QC06, MW08-2	----	----	----	14-Feb-2022	12-Feb-2022	**2**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser						
Clear Plastic Bottle - Natural MW08, MW010, BH22, BH12, QC01	----	----	----	14-Feb-2022	11-Feb-2022	**3**
Clear Plastic Bottle - Natural MW05, MW06, BH31, QC06, MW08-2	----	----	----	14-Feb-2022	12-Feb-2022	**2**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser						
Clear Plastic Bottle - Natural MW08, MW010, BH22, BH12, QC01	17-Feb-2022	10-Feb-2022	**7**	----	----	----
Clear Plastic Bottle - Natural MW05, MW06, BH31, QC06, MW08-2	17-Feb-2022	11-Feb-2022	**6**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser						
Clear Plastic Bottle - Natural MW08, MW010, BH22, BH12, QC01	17-Feb-2022	11-Feb-2022	**6**	----	----	----
Clear Plastic Bottle - Natural MW05, MW06, BH31, QC06, MW08-2	17-Feb-2022	12-Feb-2022	**5**	----	----	----

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP) - Continued					
PAH/Phenols (GC/MS - SIM)	1	14	7.14	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	6	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	6	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	14	7.14	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Ethanolamines by LCMSMS	0	10	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	6	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	6	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**15-Feb-2022**	09-Feb-2022	×
Clear Plastic Bottle - Natural (EA005-P) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**15-Feb-2022**	10-Feb-2022	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**15-Feb-2022**	09-Mar-2022	✓
Clear Plastic Bottle - Natural (EA010-P) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**15-Feb-2022**	10-Mar-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**16-Feb-2022**	16-Feb-2022	✓
Clear Plastic Bottle - Natural (EA015H) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**16-Feb-2022**	17-Feb-2022	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**15-Feb-2022**	23-Feb-2022	✓
Clear Plastic Bottle - Natural (ED037-P) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**15-Feb-2022**	24-Feb-2022	✓
ED038A: Acidity							
Clear Plastic Bottle - Natural (ED038) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**16-Feb-2022**	23-Feb-2022	✓
Clear Plastic Bottle - Natural (ED038) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**16-Feb-2022**	24-Feb-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**14-Feb-2022**	09-Mar-2022	✓
Clear Plastic Bottle - Natural (ED041G) MW01	**09-Feb-2022**	**----**	----	----	**21-Feb-2022**	09-Mar-2022	✓
Clear Plastic Bottle - Natural (ED041G) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**14-Feb-2022**	10-Mar-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**14-Feb-2022**	09-Mar-2022	✓
Clear Plastic Bottle - Natural (ED045G) MW01	**09-Feb-2022**	**----**	----	----	**21-Feb-2022**	09-Mar-2022	✓
Clear Plastic Bottle - Natural (ED045G) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**14-Feb-2022**	10-Mar-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**16-Feb-2022**	09-Mar-2022	✓
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**16-Feb-2022**	10-Mar-2022	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**16-Feb-2022**	08-Aug-2022	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) MW05, MW06, BH31, QC06, MW07-2, MW08-2	**10-Feb-2022**	**----**	----	----	**16-Feb-2022**	09-Aug-2022	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F-LL) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**15-Feb-2022**	09-Mar-2022	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F-LL) MW05, MW06, BH31, QC06, MW07-2, MW08-2	**10-Feb-2022**	**----**	----	----	**15-Feb-2022**	10-Mar-2022	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK055G) MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**14-Feb-2022**	10-Feb-2022	×
Clear Plastic Bottle - Natural (EK055G) MW05, MW06, BH31, QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**14-Feb-2022**	11-Feb-2022	×
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**14-Feb-2022**	11-Feb-2022	×
Clear Plastic Bottle - Natural (EK057G) MW05, MW06, BH31, QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**14-Feb-2022**	12-Feb-2022	×

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Natural (EK059G) MW08, BH22, QC01	MW010, BH12,	**09-Feb-2022**	**----**	----	----	**14-Feb-2022**	11-Feb-2022	×
Clear Plastic Bottle - Natural (EK059G) MW05, BH31, MW08-2	MW06, QC06,	**10-Feb-2022**	**----**	----	----	**14-Feb-2022**	12-Feb-2022	×
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Natural (EK061G) MW08, BH22, QC01	MW010, BH12,	**09-Feb-2022**	**17-Feb-2022**	10-Feb-2022	×	**17-Feb-2022**	17-Mar-2022	✓
Clear Plastic Bottle - Natural (EK061G) MW05, BH31, MW08-2	MW06, QC06,	**10-Feb-2022**	**17-Feb-2022**	11-Feb-2022	×	**17-Feb-2022**	17-Mar-2022	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Natural (EK067G) MW08, BH22, QC01	MW010, BH12,	**09-Feb-2022**	**17-Feb-2022**	11-Feb-2022	×	**17-Feb-2022**	17-Mar-2022	✓
Clear Plastic Bottle - Natural (EK067G) MW05, BH31, MW08-2	MW06, QC06,	**10-Feb-2022**	**17-Feb-2022**	12-Feb-2022	×	**17-Feb-2022**	17-Mar-2022	✓
EP066: Polychlorinated Biphenyls (PCB)								
Amber Glass Bottle - Unpreserved (EP066) QC05		**09-Feb-2022**	**16-Feb-2022**	16-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP066) MW04, MW06, QC09	MW05, BH31,	**10-Feb-2022**	**16-Feb-2022**	17-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
EP068A: Organochlorine Pesticides (OC)								
Amber Glass Bottle - Unpreserved (EP068) QC05		**09-Feb-2022**	**16-Feb-2022**	16-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP068) MW04, MW06, QC09	MW05, BH31,	**10-Feb-2022**	**16-Feb-2022**	17-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068B: Organophosphorus Pesticides (OP)							
Amber Glass Bottle - Unpreserved (EP068) QC05	**09-Feb-2022**	**16-Feb-2022**	16-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP068) MW04, MW05, MW06, BH31, QC09	**10-Feb-2022**	**16-Feb-2022**	17-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) MW08, MW010, BH22, BH12, QC01, QC03, QC05	**09-Feb-2022**	**16-Feb-2022**	16-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) MW05, MW06, BH31, QC06, QC08, QC09, MW08-2	**10-Feb-2022**	**16-Feb-2022**	17-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) MW08, MW010, BH22, BH12, QC01, QC03, QC05	**09-Feb-2022**	**16-Feb-2022**	16-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP071) MW05, MW06, BH31, QC06, QC08, QC09, MW08-2	**10-Feb-2022**	**16-Feb-2022**	17-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP080) QC08	**10-Feb-2022**	**17-Feb-2022**	17-Feb-2022	✓	**17-Feb-2022**	17-Feb-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW08, MW010, BH22, BH12, QC01, QC03, QC05	**09-Feb-2022**	**17-Feb-2022**	23-Feb-2022	✓	**17-Feb-2022**	23-Feb-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW05, MW06, BH31, QC06, QC09, MW08-2	**10-Feb-2022**	**17-Feb-2022**	24-Feb-2022	✓	**17-Feb-2022**	24-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) MW08, MW010, BH22, BH12, QC01, QC03, QC05	**09-Feb-2022**	**16-Feb-2022**	16-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP071) MW05, MW06, BH31, QC06, QC08, QC09, MW08-2	**10-Feb-2022**	**16-Feb-2022**	17-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP080) QC08	**10-Feb-2022**	**17-Feb-2022**	17-Feb-2022	✓	**17-Feb-2022**	17-Feb-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW08, MW010, BH22, BH12, QC01, QC03, QC05	**09-Feb-2022**	**17-Feb-2022**	23-Feb-2022	✓	**17-Feb-2022**	23-Feb-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW05, MW06, BH31, QC06, QC09, MW08-2	**10-Feb-2022**	**17-Feb-2022**	24-Feb-2022	✓	**17-Feb-2022**	24-Feb-2022	✓
EP080: BTEXN							
Amber Glass Bottle - Unpreserved (EP080) QC08	**10-Feb-2022**	**17-Feb-2022**	17-Feb-2022	✓	**17-Feb-2022**	17-Feb-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW08, MW010, BH22, BH12, QC01, QC03, QC05	**09-Feb-2022**	**17-Feb-2022**	23-Feb-2022	✓	**17-Feb-2022**	23-Feb-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW05, MW06, BH31, QC06, QC09, MW08-2	**10-Feb-2022**	**17-Feb-2022**	24-Feb-2022	✓	**17-Feb-2022**	24-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT)								
MW01,	MW08,	**09-Feb-2022**	**17-Feb-2022**	08-Aug-2022	✓	**18-Feb-2022**	08-Aug-2022	✓
MW010,	BH22,							
BH12,	QC01,							
QC04,	QC05							
HDPE (no PTFE) (EP231X-SUT)								
MW05,	MW06,	**10-Feb-2022**	**17-Feb-2022**	09-Aug-2022	✓	**18-Feb-2022**	09-Aug-2022	✓
BH31,	QC06,							
QC09,	TBW46,							
MW07-2,	MW08-2							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X-SUT)								
MW01,	MW08,	**09-Feb-2022**	**17-Feb-2022**	08-Aug-2022	✓	**18-Feb-2022**	08-Aug-2022	✓
MW010,	BH22,							
BH12,	QC01,							
QC04,	QC05							
HDPE (no PTFE) (EP231X-SUT)								
MW05,	MW06,	**10-Feb-2022**	**17-Feb-2022**	09-Aug-2022	✓	**18-Feb-2022**	09-Aug-2022	✓
BH31,	QC06,							
QC09,	TBW46,							
MW07-2,	MW08-2							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X-SUT)								
MW01,	MW08,	**09-Feb-2022**	**17-Feb-2022**	08-Aug-2022	✓	**18-Feb-2022**	08-Aug-2022	✓
MW010,	BH22,							
BH12,	QC01,							
QC04,	QC05							
HDPE (no PTFE) (EP231X-SUT)								
MW05,	MW06,	**10-Feb-2022**	**17-Feb-2022**	09-Aug-2022	✓	**18-Feb-2022**	09-Aug-2022	✓
BH31,	QC06,							
QC09,	TBW46,							
MW07-2,	MW08-2							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT)								
MW01,	MW08,	**09-Feb-2022**	**17-Feb-2022**	08-Aug-2022	✓	**18-Feb-2022**	08-Aug-2022	✓
MW010,	BH22,							
BH12,	QC01,							
QC04,	QC05							
HDPE (no PTFE) (EP231X-SUT)								
MW05,	MW06,	**10-Feb-2022**	**17-Feb-2022**	09-Aug-2022	✓	**18-Feb-2022**	09-Aug-2022	✓
BH31,	QC06,							
QC09,	TBW46,							
MW07-2,	MW08-2							
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X-SUT)								
MW01,	MW08,	**09-Feb-2022**	**17-Feb-2022**	08-Aug-2022	✓	**18-Feb-2022**	08-Aug-2022	✓
MW010,	BH22,							
BH12,	QC01,							
QC04,	QC05							
HDPE (no PTFE) (EP231X-SUT)								
MW05,	MW06,	**10-Feb-2022**	**17-Feb-2022**	09-Aug-2022	✓	**18-Feb-2022**	09-Aug-2022	✓
BH31,	QC06,							
QC09,	TBW46,							
MW07-2,	MW08-2							
EP262: Ethanolamines								
Amber Bottle Unpreserved for Specialist Organics (EP262)								
MW08,	MW010,	**09-Feb-2022**	**----**	----	----	**16-Feb-2022**	16-Feb-2022	✓
BH22,	BH12,							
QC01,	QC05							
Amber Bottle Unpreserved for Specialist Organics (EP262)								
QC06,	QC09,	**10-Feb-2022**	**----**	----	----	**16-Feb-2022**	17-Feb-2022	✓
MW07-2,	MW08-2							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	20	15.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	14	7.14	10.00	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	6	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	3	24	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	6	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	10.53	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	7.14	10.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acidity as Calcium Carbonate	ED038	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	25	16.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	17	23.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Pesticides by GCMS	EP068	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	24	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	17	**23.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	38	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	0	10	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	14	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Pesticides by GCMS	EP068	0	6	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	6	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Acidity as Calcium Carbonate	ED038	WATER	In house: Referenced to APHA 2310 B Acidity is determined by manual titration with a standardised alkali to an end-point pH of 8.3. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS - Low Level	EG035F-LL	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).

Analytical Methods	Method	Matrix	Method Descriptions
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is concentrated, combined with an equal volume of reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines by LCMSMS	EP262	WATER	In house: LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office: Perth

Report Results to: Bernie Weekes | Mobile: 0407 817 762 | Email: bernie.weekes@coffey.com

Invoices to: Tetra Tech Coffey (Perth) | Phone: | Email:

Project No: PEREN295751 | Task No:

Project Name: Perdaman | Laboratory: ALS

Sampler's Name: Nick Taylor | Project Manager: Bernie Weekes

Quote number (if different to current quoted prices): EP/1105/21

Special Instructions: firm 5 day tat required on all samples. MW04 limited sample volume. BH22 black water with organic odour (source of colour unknown). Metals were not field filtered. All metals samples were field filtered. BH31 slight organic odour water light grey in colour. Super trace for PCB's, OC/OP pesticides no longer required just standard level

Analysis Request Section

ALS Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	ASSGW-1	FW-2(ANZECC)	EP066 (PCB)	EP068-A (OC Pesticides)	EP068B (OP pesticides)	EP231X-SUT	EP262	NT-08	W-07	W-18	Hold	NOTES
1	MW01	2/09/2022		Water		3-5 day	x	x				x						
SNR	MW02	2/09/2022		Water		3-5 day	x	x				x	x	x				
SNR	MW03	2/09/2022		Water		3-5 day	x	x				x	x	x	x			
2	MW04	2/10/2022		Water		3-5 day		x	x	x	x	x		x	x			
3	MW05	2/10/2022		Water		3-5 day		x	x	x	x	x		x	x			
4	MW06	2/10/2022		Water		3-5 day		x	x	x	x	x		x	x			
SNR	MW07	2/09/2022		Water		3-5 day	x	x				x	x	x	x			
5	MW08	2/09/2022		Water		3-5 day	x	x				x	x	x	x			
SNR	MW09	2/09/2022		Water		3-5 day	x	x				x	x	x				
6	MW010	2/09/2022		Water		3-5 day	x	x				x	x	x	x			
7	BH22	2/09/2022		Water		3-5 day	x	x				x	x	x	x			
8	BH31	2/10/2022		Water		3-5 day		x	x	x	x	x		x	x			
9	BH12	2/09/2022		Water		3-5 day	x	x				x	x	x	x			
SNR	BH27	2/09/2022		Water		3-5 day	x	x				x	x	x				
10	QC01	2/09/2022		Water		3-5 day	x	x				x	x	x	x			
-	QC02	2/09/2022		Water		3-5 day										x		Forward this sample to Eurofins and request testing for same suite as QC1

Environmental Division Perth
Work Order Reference
EP2201691

Telephone : -- 61-8-9406 1301

RELINQUISHED BY

Name: Bernie Weekes | Date: 2/11/2022

RECEIVED BY

Name: Louffy ALS | Date: 14/2 1340

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐

Chain of custody
Issued: 30 July 2020
UNCONTROLLED WHEN PRINTED

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2202113**	Page	: 1 of 19
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman PSI	Date Samples Received	: 23-Feb-2022 11:30
Order number	: ----	Date Analysis Commenced	: 23-Feb-2022
C-O-C number	: ----	Issue Date	: 01-Mar-2022 09:14
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 8		
No. of samples analysed	: 8		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X(-SUT) and EP262 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP262: Matrix spike recovery not determined due to dilution requirement.
- EP262 :Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG020 and EG035: Metals LOR for sample EP2202113 -001 to -004 and -008 raised due to high TDS content.
- EK055G: Ammonia LOR raised for sample #1, 2, 4 and 8 due to possible sample matrix interference.
- EP262: ALS is not NATA accredited for the analysis of MDEA.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW03	MW02	BH27	QC1	QC3
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2202113-001	EP2202113-002	EP2202113-003	EP2202113-004	EP2202113-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.54	7.26	7.10	7.58	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	122000	177000	190000	121000	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	108000	177000	183000	106000	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	117	60	73	121	----
Total Alkalinity as CaCO3	----	1	mg/L	117	60	73	121	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	27	30	36	26	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5580	7270	6880	5630	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	50900	86900	100000	51500	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	772	1250	1490	782	----
Magnesium	7439-95-4	1	mg/L	3120	5420	6020	3100	----
Sodium	7440-23-5	1	mg/L	33200	51000	61500	31900	----
Potassium	7440-09-7	1	mg/L	1260	1830	2160	1280	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.20	<0.20	<0.20	<0.20	----
Arsenic	7440-38-2	0.001	mg/L	<0.020	<0.020	<0.020	<0.020	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	----
Chromium	7440-47-3	0.001	mg/L	<0.020	<0.020	<0.020	<0.020	----
Copper	7440-50-8	0.001	mg/L	<0.020	<0.020	<0.020	<0.020	----
Nickel	7440-02-0	0.001	mg/L	<0.020	<0.020	<0.020	<0.020	----
Lead	7439-92-1	0.001	mg/L	<0.020	<0.020	<0.020	<0.020	----
Zinc	7440-66-6	0.005	mg/L	<0.100	<0.100	<0.100	<0.100	----
Manganese	7439-96-5	0.001	mg/L	<0.020	0.033	0.657	<0.020	----
Iron	7439-89-6	0.05	mg/L	<1.00	<1.00	<1.00	<1.00	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW03	MW02	BH27	QC1	QC3
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2202113-001	EP2202113-002	EP2202113-003	EP2202113-004	EP2202113-005
				Result	Result	Result	Result	Result
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.05	<0.05	0.07	<0.05	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	0.01	0.02	0.02	<0.01	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	0.18	0.92	1.22	0.20	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.19	0.94	1.24	0.20	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	1.4	1.6	0.8	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	0.9	2.3	2.8	1.0	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.11	0.08	0.46	0.11	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	1550	2600	2960	1570	----
ø Total Cations	----	0.01	meq/L	1770	2770	3300	1710	----
ø Ionic Balance	----	0.01	%	6.53	3.16	5.34	4.32	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	<1	----	----	<1	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	<0.5	----	----	<0.5	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	----	----	<0.5	----
beta-BHC	319-85-7	0.5	µg/L	<0.5	----	----	<0.5	----
gamma-BHC	58-89-9	0.5	µg/L	<0.5	----	----	<0.5	----
delta-BHC	319-86-8	0.5	µg/L	<0.5	----	----	<0.5	----
Heptachlor	76-44-8	0.5	µg/L	<0.5	----	----	<0.5	----
Aldrin	309-00-2	0.5	µg/L	<0.5	----	----	<0.5	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	----	----	<0.5	----
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	----	----	<0.5	----
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	----	----	<0.5	----
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	----	----	<0.5	----
Dieldrin	60-57-1	0.5	µg/L	<0.5	----	----	<0.5	----
4.4`-DDE	72-55-9	0.5	µg/L	<0.5	----	----	<0.5	----
Endrin	72-20-8	0.5	µg/L	<0.5	----	----	<0.5	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW03	MW02	BH27	QC1	QC3
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2202113-001	EP2202113-002	EP2202113-003	EP2202113-004	EP2202113-005
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	----	----	<0.5	----
4.4`-DDD	72-54-8	0.5	µg/L	<0.5	----	----	<0.5	----
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	----	----	<0.5	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	----	----	<0.5	----
4.4`-DDT	50-29-3	2.0	µg/L	<2.0	----	----	<2.0	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	----	----	<0.5	----
Methoxychlor	72-43-5	2.0	µg/L	<2.0	----	----	<2.0	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	<0.5	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	<0.5	----	----	<0.5	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	<0.5	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	----	----	<0.5	----
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	----	----	<0.5	----
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	----	----	<2.0	----
Dimethoate	60-51-5	0.5	µg/L	<0.5	----	----	<0.5	----
Diazinon	333-41-5	0.5	µg/L	<0.5	----	----	<0.5	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	----	----	<0.5	----
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	----	----	<2.0	----
Malathion	121-75-5	0.5	µg/L	<0.5	----	----	<0.5	----
Fenthion	55-38-9	0.5	µg/L	<0.5	----	----	<0.5	----
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	----	----	<0.5	----
Parathion	56-38-2	2.0	µg/L	<2.0	----	----	<2.0	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	----	----	<0.5	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	----	----	<0.5	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	----	----	<0.5	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	----	----	<0.5	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	----	----	<0.5	----
Ethion	563-12-2	0.5	µg/L	<0.5	----	----	<0.5	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	----	----	<0.5	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	----	----	<0.5	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	<1.0	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	<1.0	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	<1.0	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW03	MW02	BH27	QC1	QC3
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2202113-001	EP2202113-002	EP2202113-003	EP2202113-004	EP2202113-005
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	<1.0	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	<1.0	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	<1.0	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	<1.0	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	<1.0	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	<1.0	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	<1.0	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	<1.0	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	<0.5	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	----	----	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	----	----	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	----	----	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	<1	<1
Toluene	108-88-3	2	µg/L	<2	----	----	<2	<2

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW03	MW02	BH27	QC1	QC3
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2202113-001	EP2202113-002	EP2202113-003	EP2202113-004	EP2202113-005
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	<2	<2
^ Total Xylenes	----	2	µg/L	<2	----	----	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	----	----	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	----	----	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	**0.0047**	**0.0012**	**0.0071**	**0.0048**	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	**0.0064**	<0.0005	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	**0.0016**	<0.0005	**0.0285**	**0.0014**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	**0.0026**	<0.0005	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	**0.0269**	<0.0002	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	**0.299**	**0.0647**	**0.0171**	**0.278**	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	**0.562**	**0.104**	**0.0272**	**0.601**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	**0.104**	**0.0020**	**0.0036**	**0.103**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	**0.289**	**0.0264**	**0.0319**	**0.318**	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	**0.0109**	<0.0005	**0.0034**	**0.0129**	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	**0.0006**	<0.0005	<0.0005	**0.0006**	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW03	MW02	BH27	QC1	QC3
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2202113-001	EP2202113-002	EP2202113-003	EP2202113-004	EP2202113-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	**0.006**	<0.001	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
EP231P: PFAS Sums								
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	**0.0016**	<0.0002	**0.0554**	**0.0014**	----
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	**1.27**	**0.198**	**0.152**	**1.32**	----
^ Sum of PFAS	----	0.0002	µg/L	**1.27**	**0.198**	**0.161**	**1.32**	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<10	<10	<10	<10	----
Diethanolamine	111-42-2	1	µg/L	<10	<10	<10	<10	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<10	<10	<10	<10	----
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW03	MW02	BH27	QC1	QC3
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2202113-001	EP2202113-002	EP2202113-003	EP2202113-004	EP2202113-005
				Result	Result	Result	Result	Result
EP066S: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	1	%	37.7	----	----	44.4	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	51.6	----	----	50.9	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	46.9	----	----	42.3	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	25.4	----	----	27.0	----
2-Chlorophenol-D4	93951-73-6	1.0	%	44.5	----	----	47.1	----
2.4.6-Tribromophenol	118-79-6	1.0	%	35.6	----	----	51.1	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	53.9	----	----	55.2	----
Anthracene-d10	1719-06-8	1.0	%	56.6	----	----	57.6	----
4-Terphenyl-d14	1718-51-0	1.0	%	51.4	----	----	51.9	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	80.8	----	----	84.3	88.0
Toluene-D8	2037-26-5	2	%	99.0	----	----	97.6	99.7
4-Bromofluorobenzene	460-00-4	2	%	77.2	----	----	77.1	87.8
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	91.8	90.6	92.5	91.5	----
13C8-PFOA	----	0.0005	%	83.6	83.3	94.0	92.7	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	----	----	7.35	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	----	135000	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	----	124000	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	97	----	----
Total Alkalinity as CaCO3	----	1	mg/L	----	----	97	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	----	----	32	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	6440	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	----	----	62600	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	----	1190	----	----
Magnesium	7439-95-4	1	mg/L	----	----	4360	----	----
Sodium	7440-23-5	1	mg/L	----	----	41400	----	----
Potassium	7440-09-7	1	mg/L	----	----	1430	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	----	----	<0.20	----	----
Arsenic	7440-38-2	0.001	mg/L	----	----	<0.020	----	----
Cadmium	7440-43-9	0.0001	mg/L	----	----	<0.0020	----	----
Chromium	7440-47-3	0.001	mg/L	----	----	<0.020	----	----
Copper	7440-50-8	0.001	mg/L	----	----	<0.020	----	----
Nickel	7440-02-0	0.001	mg/L	----	----	<0.020	----	----
Lead	7439-92-1	0.001	mg/L	----	----	<0.020	----	----
Zinc	7440-66-6	0.005	mg/L	----	----	<0.100	----	----
Manganese	7439-96-5	0.001	mg/L	----	----	1.35	----	----
Iron	7439-89-6	0.05	mg/L	----	----	<1.00	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EG020T: Total Metals by ICP-MS - Continued								
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	----	----	<0.00020	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	----	<0.05	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	----	----	**0.02**	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	----	----	**0.05**	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	**0.07**	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	**1.3**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	----	----	**1.4**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	----	----	**0.39**	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	----	----	**1900**	----	----
ø Total Cations	----	0.01	meq/L	----	----	**2260**	----	----
ø Ionic Balance	----	0.01	%	----	----	**8.51**	----	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	<1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	<0.5	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-BHC	319-85-7	0.5	µg/L	<0.5	----	----	----	----
gamma-BHC	58-89-9	0.5	µg/L	<0.5	----	----	----	----
delta-BHC	319-86-8	0.5	µg/L	<0.5	----	----	----	----
Heptachlor	76-44-8	0.5	µg/L	<0.5	----	----	----	----
Aldrin	309-00-2	0.5	µg/L	<0.5	----	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	----	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	----	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	----	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	----	----	----	----
Dieldrin	60-57-1	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDE	72-55-9	0.5	µg/L	<0.5	----	----	----	----
Endrin	72-20-8	0.5	µg/L	<0.5	----	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDD	72-54-8	0.5	µg/L	<0.5	----	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	----	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDT	50-29-3	2.0	µg/L	<2.0	----	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	----	----	----	----
Methoxychlor	72-43-5	2.0	µg/L	<2.0	----	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	<0.5	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	----	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	----	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	----	----	----	----
Dimethoate	60-51-5	0.5	µg/L	<0.5	----	----	----	----
Diazinon	333-41-5	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	----	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	----	----	----	----
Malathion	121-75-5	0.5	µg/L	<0.5	----	----	----	----
Fenthion	55-38-9	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	----	----	----	----
Parathion	56-38-2	2.0	µg/L	<2.0	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued								
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	----	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	----	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	----	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	----	----	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	----	----	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	----	----	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	----	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	----	----	**0.0011**	----	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	----	----	<0.0005	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	----	----	<0.0005	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	----	----	<0.0002	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	----	----	**0.0648**	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	----	----	**0.114**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	----	----	**0.0012**	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	----	----	**0.0558**	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	----	----	<0.0005	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	----	----	<0.0005	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	----	----	<0.0005	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	----	----	<0.0005	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	----	----	<0.001	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	----	----	<0.001	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	----	----	<0.001	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	----	----	<0.001	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	----	----	<0.0005	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	----	----	<0.0005	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	----	----	<0.001	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	----	----	<0.001	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	----	----	<0.001	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	----	----	<0.001	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	----	----	<0.0002	----	----
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	----	----	**0.237**	----	----
^ Sum of PFAS	----	0.0002	µg/L	----	----	**0.237**	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<10	----	<10	----	----
Diethanolamine	111-42-2	1	µg/L	<10	----	<10	----	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<10	----	<10	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	1	%	**32.2**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	50.1	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	37.5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	14.2	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	38.2	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	39.1	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	47.1	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%	49.6	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	44.5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	88.2	84.8	----	----	----
Toluene-D8	2037-26-5	2	%	99.0	98.6	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	85.0	84.8	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	98.4	----	----	----	----
13C8-PFOA	----	0.02	%	95.4	----	----	----	----
13C4-PFOS	----	0.0005	%	----	----	94.2	----	----
13C8-PFOA	----	0.0005	%	----	----	91.0	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	27	136
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	50	146
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	27	153
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	67
2-Chlorophenol-D4	93951-73-6	29	120
2.4.6-Tribromophenol	118-79-6	10	131
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	34	131
Anthracene-d10	1719-06-8	43	126
4-Terphenyl-d14	1718-51-0	41	142
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP262: Ethanolamines

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2202113**	Page	: 1 of 15
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman PSI	Date Samples Received	: 23-Feb-2022
Order number	: ----	Date Analysis Commenced	: 23-Feb-2022
C-O-C number	: ----	Issue Date	: 01-Mar-2022
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 8		
No. of samples analysed	: 8		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 4193585)									
EP2202161-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.41	8.41	0.0	0% - 20%
EP2202105-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.42	8.46	0.5	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4193586)									
EP2202161-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	543	545	0.4	0% - 20%
EP2202105-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	916	927	1.2	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 4192441)									
EP2202046-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	234	260	10.3	0% - 20%
EP2202046-011	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	256	250	2.6	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4193588)									
EP2202161-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	4	4	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	138	141	2.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	142	145	2.0	0% - 20%
EP2202105-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	8	11	28.2	0% - 50%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	212	210	1.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	220	220	0.0	0% - 20%
ED038A: Acidity (QC Lot: 4195053)									
EP2202034-001	Anonymous	ED038: Acidity as CaCO3	----	1	mg/L	95	97	1.7	0% - 20%
EP2202113-001	MW03	ED038: Acidity as CaCO3	----	1	mg/L	27	27	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4191784)									
EP2202113-002	MW02	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	7270	7340	1.1	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4191785)									

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED045G: Chloride by Discrete Analyser (QC Lot: 4191785) - continued									
EP2202113-002	MW02	ED045G: Chloride	16887-00-6	1	mg/L	86900	88000	1.3	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4193078)									
EP2202105-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	60	60	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	43	43	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	75	75	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	12	13	0.0	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4193077)									
EP2202034-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.453	0.458	1.2	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.069	0.072	4.4	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.031	0.032	3.5	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.01	0.01	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	19.6	19.9	1.7	0% - 20%
EP2202105-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.128	0.129	1.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.012	0.012	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.12	0.06	63.9	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 4193115)									
EP2202034-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.006	0.006	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.003	0.004	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.0	No Limit
EP2202088-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EG020T: Total Metals by ICP-MS (QC Lot: 4193115) - continued									
EP2202088-001	Anonymous	EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 4195695)									
EP2202113-001	MW03	EG035F-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00020	<0.00020	0.0	No Limit
EP2202163-001	Anonymous	EG035F-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00004	<0.00004	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4193126)									
EP2202089-007	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 4191375)									
EP2202113-002	MW02	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.05	<0.05	0.0	No Limit
EP2202113-001	MW03	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.05	<0.05	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4191783)									
EP2202113-002	MW02	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.02	0.02	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4191374)									
EP2202113-002	MW02	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.94	0.93	0.0	0% - 20%
EP2202113-001	MW03	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.19	0.19	0.0	0% - 50%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4193504)									
EP2201996-021	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.2	3.5	18.6	0% - 20%
EP2202113-001	MW03	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	0.8	12.7	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4193505)									
EP2201996-021	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.70	0.65	7.6	0% - 20%
EP2202113-001	MW03	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.11	0.12	10.5	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4192469)									
EP2201996-021	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<0.02 mg/L	<20	0.0	No Limit
EP2202113-006	QC4	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4192469)									
EP2201996-021	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<0.02 mg/L	<20	0.0	No Limit
EP2202113-006	QC4	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 4192469)									
EP2201996-021	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<0.001 mg/L	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<0.002 mg/L	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<0.002 mg/L	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<0.002 mg/L	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<0.002 mg/L	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<0.005 mg/L	<5	0.0	No Limit
EP2202113-006	QC4	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080: BTEXN (QC Lot: 4192469) - continued									
EP2202113-006	QC4	EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4194459)									
EP2202113-006	QC4	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4194459)									
EP2202113-006	QC4	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4194459)									
EP2202113-006	QC4	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4194459)									
EP2202113-006	QC4	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4194459) - continued									
EP2202113-006	QC4	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4194459)									
EP2202113-006	QC4	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP262: Ethanolamines (QC Lot: 4194734)									
EP2202118-001	Anonymous	EP262: Ethanolamine	141-43-5	1	µg/L	<10	<10	0.0	No Limit
		EP262: Diethanolamine	111-42-2	1	µg/L	<10	<10	0.0	No Limit
		EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<10	<10	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 4193585)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.5	102
				----	7 pH Unit	100	98.5	102
EA010P: Conductivity by PC Titrator (QCLot: 4193586)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	24800 µS/cm	96.4	92.1	105
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 4192441)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	101	88.1	114
				<10	1000 mg/L	99.4	88.1	114
ED037P: Alkalinity by PC Titrator (QCLot: 4193588)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	101	81.2	126
				<1	200 mg/L	99.9	90.0	110
ED038A: Acidity (QCLot: 4195053)								
ED038: Acidity as CaCO3	----	----	mg/L	----	19.5 mg/L	97.4	83.6	128
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4191784)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	87.7	113
				<1	500 mg/L	97.1	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 4191785)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	92.8	87.9	114
				<1	1000 mg/L	105	87.9	114
ED093F: Dissolved Major Cations (QCLot: 4193078)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	111	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	103	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	102	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	89.7	108
EG020F: Dissolved Metals by ICP-MS (QCLot: 4193077)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	94.4	84.0	120
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	84.0	120
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.4	86.0	120
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.6	85.0	120
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.0	84.0	120
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.6	85.0	120

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4193077) - continued								
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.2	85.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.1	84.0	120
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.0	89.0	120
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	107	84.0	120
EG020T: Total Metals by ICP-MS (QCLot: 4193115)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.7	89.6	118
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.3	89.2	116
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.3	87.8	114
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.2	85.8	115
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.5	88.4	111
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.9	87.4	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	88.1	120
EG035F: Dissolved Mercury by FIMS (QCLot: 4195695)								
EG035F-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00004	0.01 mg/L	96.1	87.6	115
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4193126)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	102	85.1	115
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4191375)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	96.8	86.2	111
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4191783)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	102	88.7	113
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4191374)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	94.0	90.5	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4193504)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	91.7	75.8	100
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4193505)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	94.1	70.0	110
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4192516)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	5 µg/L	64.0	36.2	90.2
EP068A: Organochlorine Pesticides (OC) (QCLot: 4192517)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	48.7	42.3	112
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	41.5	39.0	108
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	51.3	45.5	116
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	49.5	43.0	118
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	52.6	46.2	115
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	41.5	39.0	111
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	49.9	39.7	114
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	55.0	42.4	122

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4192517) - continued								
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	55.0	43.6	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	54.2	42.1	129
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	55.4	42.7	123
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	44.0	42.4	121
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	54.4	43.8	123
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	47.6	26.9	127
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	53.9	44.9	128
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	73.0	41.7	128
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	44.3	32.2	121
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	50.8	40.7	120
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	44.3	31.6	123
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	47.3	36.4	124
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	52.8	25.4	124
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4192517)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	43.8	38.8	110
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	48.8	34.6	115
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	1.2	0	20.1
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	40.4	27.8	102
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	52.1	46.1	122
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	48.5	46.6	118
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	38.1	26.8	110
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	48.2	38.8	119
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	51.6	45.0	119
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	52.6	44.6	118
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	43.5	30.2	112
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	53.3	43.2	123
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	55.5	41.1	119
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	47.4	34.4	125
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	41.9	19.9	123
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	50.7	38.0	121
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	51.4	39.5	121
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	50.0	39.7	119
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	22.6	0	137
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4192515)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	53.4	41.9	99.1
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	57.8	36.1	113
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	52.0	35.8	102
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	53.5	33.5	113
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	52.1	36.5	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4192515) - continued								
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	56.4	46.4	109
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	52.7	40.4	124
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	51.5	40.2	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	49.2	40.2	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	49.8	45.6	121
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	10 µg/L	50.1	43.2	123
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	49.6	47.3	121
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	48.5	44.8	123
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	41.4	38.8	120
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	51.4	39.4	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	44.8	40.1	123
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4192469)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	102	73.6	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4192514)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	368 µg/L	55.8	39.3	103
EP071: C15 - C28 Fraction	----	100	µg/L	<100	369 µg/L	81.2	47.2	122
EP071: C29 - C36 Fraction	----	50	µg/L	<50	297 µg/L	75.7	42.5	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4192469)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	105	73.9	115
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4192514)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	370 µg/L	59.6	42.0	104
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	482 µg/L	80.2	46.2	116
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	283 µg/L	73.8	24.7	137
EP080: BTEXN (QCLot: 4192469)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	112	84.1	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	114	81.0	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	100	84.4	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	114	84.3	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	103	86.5	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	104	77.0	118
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4193421)								
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	96.8	72.0	130
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	116	71.0	127
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	116	68.0	131
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	117	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4193421) - continued								
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	83.2	65.0	140
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	63.2	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4194459)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	96.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	95.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	98.6	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	101	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	92.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4193421)								
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	109	73.0	129
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	120	72.0	129
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	117	72.0	129
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	104	72.0	130
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	81.2	71.0	133
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	82.0	69.0	130
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	79.6	71.0	129
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	88.4	69.0	133
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	98.4	72.0	134
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	80.8	65.0	144
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	92.3	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4194459)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	104	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	99.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	104	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	105	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	112	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	105	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	112	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4193421)								
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	101	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	116	68.0	141

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4193421) - continued								
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	85.4	56.6	136
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	124	61.9	129
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	75.8	52.8	135
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	86.8	65.0	136
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	92.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4194459)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	109	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	108	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	111	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	103	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	115	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	102	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	111	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4193421)								
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	96.4	63.0	143
EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.004 µg/L	95.6	64.0	140
EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.004 µg/L	92.8	67.0	138
EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	0.004 µg/L	82.8	60.9	136
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4194459)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	102	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	112	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	101	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	101	71.4	144
EP231P: PFAS Sums (QCLot: 4193421)								
EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	----	----	----	----
EP262: Ethanolamines (QCLot: 4194734)								
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	95.4	50.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP262: Ethanolamines (QCLot: 4194734) - continued								
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	69.7	50.0	130
EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	10 µg/L	99.4	50.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4191784)							
EP2202113-001	MW03	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4191785)							
EP2202113-001	MW03	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4193077)							
EP2202062-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	103	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	98.9	70.0	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	98.5	70.0	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	102	70.0	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	93.6	70.0	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	98.2	70.0	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	103	70.0	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	103	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 4193115)							
EP2202034-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	91.7	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	93.9	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	91.7	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	91.5	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	98.2	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	91.9	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	91.0	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4195695)							
EP2202113-002	MW02	EG035F-LL: Mercury	7439-97-6	0.5 mg/L	91.7	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4193126)							
EP2202089-008	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	96.7	70.0	130

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4191375)							
EP2202113-003	BH27	EK055G: Ammonia as N	7664-41-7	1 mg/L	125	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4191783)							
EP2202113-001	MW03	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	98.2	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4191374)							
EP2202113-003	BH27	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	86.0	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4193504)							
EP2201996-022	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	97.1	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4193505)							
EP2201996-022	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	98.8	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4192469)							
EP2201996-022	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	103	77.0	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4192469)							
EP2201996-022	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	82.3	77.0	137
EP080: BTEXN (QCLot: 4192469)							
EP2201996-022	Anonymous	EP080: Benzene	71-43-2	20 µg/L	80.0	77.0	122
		EP080: Toluene	108-88-3	20 µg/L	86.0	73.5	126
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4194459)							
EP2202113-006	QC4	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	106	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	99.8	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	99.2	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	102	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	100	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	99.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4194459)							
EP2202113-006	QC4	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	102	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	101	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	108	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	109	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	110	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	97.2	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	97.6	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	106	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	106	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	97.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	116	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4194459)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4194459) - continued							
EP2202113-006	QC4	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	92.8	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	90.5	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	101	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	107	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	94.8	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	111	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4194459)							
EP2202113-006	QC4	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	104	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	110	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	96.0	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	91.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2202113**	Page	: 1 of 12
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman PSI	Date Samples Received	: 23-Feb-2022
Site	: ----	Issue Date	: 01-Mar-2022
Sampler	: SANJANA AUDIT	No. of samples received	: 8
Order number	: ----	No. of samples analysed	: 8

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2202113--001	MW03	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2202113--001	MW03	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
MW03, BH27, MW09	MW02, QC1,	----	----	----	24-Feb-2022	21-Feb-2022	**3**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	9	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	5	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Ethanolamines by LCMSMS	0	7	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	9	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	5	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**24-Feb-2022**	21-Feb-2022	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**24-Feb-2022**	21-Mar-2022	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**24-Feb-2022**	28-Feb-2022	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**24-Feb-2022**	07-Mar-2022	✓
ED038A: Acidity							
Clear Plastic Bottle - Natural (ED038) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**25-Feb-2022**	07-Mar-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**23-Feb-2022**	21-Mar-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**23-Feb-2022**	21-Mar-2022	✓
ED093F: Dissolved Major Cations							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (ED093F) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**24-Feb-2022**	21-Mar-2022	✓
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**24-Feb-2022**	20-Aug-2022	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) QC4	**21-Feb-2022**	**24-Feb-2022**	20-Aug-2022	✓	**24-Feb-2022**	20-Aug-2022	✓
EG035F: Dissolved Mercury by FIMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG035F-LL) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**25-Feb-2022**	21-Mar-2022	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG035T) QC4	**21-Feb-2022**	**----**	----	----	**25-Feb-2022**	21-Mar-2022	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**23-Feb-2022**	21-Mar-2022	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**23-Feb-2022**	23-Feb-2022	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**23-Feb-2022**	21-Mar-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**25-Feb-2022**	21-Mar-2022	✓	**25-Feb-2022**	21-Mar-2022	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**25-Feb-2022**	21-Mar-2022	✓	**25-Feb-2022**	21-Mar-2022	✓
EP066: Polychlorinated Biphenyls (PCB)							
Amber Glass Bottle - Unpreserved (EP066) MW03, QC1, QC4	**21-Feb-2022**	**24-Feb-2022**	28-Feb-2022	✓	**25-Feb-2022**	05-Apr-2022	✓
EP068A: Organochlorine Pesticides (OC)							
Amber Glass Bottle - Unpreserved (EP068) MW03, QC1, QC4	**21-Feb-2022**	**24-Feb-2022**	28-Feb-2022	✓	**25-Feb-2022**	05-Apr-2022	✓
EP068B: Organophosphorus Pesticides (OP)							
Amber Glass Bottle - Unpreserved (EP068) MW03, QC1, QC4	**21-Feb-2022**	**24-Feb-2022**	28-Feb-2022	✓	**25-Feb-2022**	05-Apr-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) MW03, QC1, QC4	**21-Feb-2022**	**24-Feb-2022**	28-Feb-2022	✓	**25-Feb-2022**	05-Apr-2022	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) MW03, QC1, QC3, QC4	**21-Feb-2022**	**24-Feb-2022**	28-Feb-2022	✓	**25-Feb-2022**	05-Apr-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW03, QC1, QC3, QC4, TBW166	**21-Feb-2022**	**24-Feb-2022**	07-Mar-2022	✓	**24-Feb-2022**	07-Mar-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) MW03, QC1, QC3, QC4	**21-Feb-2022**	**24-Feb-2022**	28-Feb-2022	✓	**25-Feb-2022**	05-Apr-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW03, QC1, QC3, QC4, TBW166	**21-Feb-2022**	**24-Feb-2022**	07-Mar-2022	✓	**24-Feb-2022**	07-Mar-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) MW03, QC1, QC3, QC4, TBW166	**21-Feb-2022**	**24-Feb-2022**	07-Mar-2022	✓	**24-Feb-2022**	07-Mar-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) MW03, MW02, BH27, QC1, QC4, MW09	**21-Feb-2022**	**24-Feb-2022**	20-Aug-2022	✓	**25-Feb-2022**	20-Aug-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-SUT) MW03, MW02, BH27, QC1, QC4, MW09	**21-Feb-2022**	**24-Feb-2022**	20-Aug-2022	✓	**25-Feb-2022**	20-Aug-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-SUT) MW03, MW02, BH27, QC1, QC4, MW09	**21-Feb-2022**	**24-Feb-2022**	20-Aug-2022	✓	**25-Feb-2022**	20-Aug-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) MW03, MW02, BH27, QC1, QC4, MW09	**21-Feb-2022**	**24-Feb-2022**	20-Aug-2022	✓	**25-Feb-2022**	20-Aug-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-SUT) MW03, MW02, BH27, QC1, QC4, MW09	**21-Feb-2022**	**24-Feb-2022**	20-Aug-2022	✓	**25-Feb-2022**	20-Aug-2022	✓
EP262: Ethanolamines							
Amber Bottle Unpreserved for Specialist Organics (EP262) MW03, MW02, BH27, QC1, QC4, MW09	**21-Feb-2022**	**----**	----	----	**25-Feb-2022**	28-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	3	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	9	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	3	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	3	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	11.76	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	5	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acidity as Calcium Carbonate	ED038	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	7	28.57	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	7	**28.57**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	17	**5.88**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	0	7	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	9	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	5	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Acidity as Calcium Carbonate	ED038	WATER	In house: Referenced to APHA 2310 B Acidity is determined by manual titration with a standardised alkali to an end-point pH of 8.3. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS - Low Level	EG035F-LL	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is concentrated, combined with an equal volume of reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines by LCMSMS	EP262	WATER	In house: LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office: Tetra Tech Coffey
Report Results to: Bernie Weekes
Invoices to: accounts.perth@tetratech.com

Mobile: 0407817762
Phone:

Email: bernie.weekes@coffey.com @tetratech.com
Email: @tetratech.com

Project No: 754-PERGN295751
Task No:
Project Name: Perdaman PS I
Laboratory: ALS
Sampler's Name: Sanjana Audit
Project Manager: Bernie Weekes
Quote number (if different to current quoted prices):
Special Instructions:

Analysis Request Section

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	Interlab triplicate, please send to ALS
1	MW03	21/2/22	AM	water	various	3-days	
2	MW02	"	"	"		"	
3	BH27	"	"	"		"	
4	QC1	"	"	"		"	
	QC2	"	"	"		"	✓
5	QC3	"	"	"		"	
6	QC4	"	"	"		"	
7	TBW166	"	"	"	1 vial	"	
8	MW09	"	"	"	various	"	

NOTES

Analysis to be emailed by Bernie Weekes

Environmental Division Perth
Work Order Reference
EP2202113

Telephone : -- 61-8-9406 1301

RELINQUISHED BY		RECEIVED BY	
Name: Sanjana Audit	Date: 21/2/22 →	Name: Louflm	Date: 23/2
Coffey	Time:	Company: ALS	Time: 1130
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)

- All Samples Recieved in Good Condition ☐
- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

TETRA TECH COFFEY

Consigning Office: Perth

Report Results to: Bernie Weekes | Mobile: 0407 817 762 | Email: bernie.weekes@coffey.com

Invoices to: Tetra Tech Coffey (Perth) | Phone: | Email:

Project No: PEREN295751 | Task No:

Project Name: Perdaman | Laboratory: ALS

Sampler's Name: Anne Foster | Project Manager: Bernie Weekes

Quote number (if different to current quoted prices):

Special Instructions: firm 5 day tat required on all samples. MW04 limited sample water. BH22 black water with organic odour.

Analysis Request Section

ALS Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	ASSGW-1	FW-2(ANZECC)	EP066 (PCB)	EP068-A (OC Pesticides)	EP068B (OP pesticides)	EP231X-SUT	EP262	NT-08	W-07	W-18	Hold			NOTES
11	QC03	2/09/2022		Water		3-5 day									X					
12	QC04	2/09/2022		Water		3-5 day						X								
13	QC05	2/09/2022		Water		3-5 day			X	X	X	X	X		X					
14	QC06	2/10/2022		Water		3-5 day	X	X				X	X	X	X					
–	QC07	2/10/2022		Water		3-5 day											X			Forward this sample to Eurofins and request same testing as QC06
15	QC08	2/10/2022		Water		3-5 day									X					
16	QC09	2/10/2022		Water		3-5 day			X	X	X	X	X		X					
17	TBW46	2/10/2022		Water		3-5 day										X				
18	MW07-2	2/10/2022		Water		3-5 day	X	X				X	X	X	X					
19	MW08-2	2/10/2022		Water		3-5 day	X	X				X	X	X	X					

RELINQUISHED BY		RECEIVED BY	
Name: Bernie Weekes	Date: 2/11/2022	Name:	Date:
Coffey	Time:	Company:	Time:
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)

- All Samples Recieved in Good Condition ☐
- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2200878**	Page	: 1 of 6
Amendment	: **(Preliminary Report)**		
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 724-PEREN295751 PERDAMAN	Date Samples Received	: 27-Jan-2022 10:30
Order number	: ----	Date Analysis Commenced	: 27-Jan-2022
C-O-C number	: ----	Issue Date	: 28-Jan-2022 10:54
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 19		
No. of samples analysed	: 18		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

This report contains preliminary authorised results. The report may contain semi-quantitative results. Any result presented in this preliminary report may be subject to change in the final report.

- PFAS and EP262 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EP262: ALS is not NATA accredited for the analysis of MDEA.
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS23_0m	SS23_0.5m	ASS8_0m	ASS8_0.25m	ASS8_0.5m
			Sampling date / time	24-Jan-2022 11:00	24-Jan-2022 11:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2200878-001	EP2200878-002	EP2200878-004	EP2200878-005	EP2200878-006
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	----	----	8.1	8.4	8.3
pH (Fox)	----	0.1	pH Unit	----	----	6.9	7.0	7.1
Reaction Rate	----	1	-	----	----	Strong	Strong	Moderate
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	-	%	Not Authorised	Not Authorised	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS8_0.75m	ASS8_1.00m	ASS8_1.25m	ASS8_1.5m	ASS8_1.75m
			Sampling date / time	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2200878-007	EP2200878-008	EP2200878-009	EP2200878-010	EP2200878-011
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.2**	**8.5**	**8.7**	**8.8**	**9.0**
pH (Fox)	----	0.1	pH Unit	**7.0**	**7.8**	**6.8**	**6.9**	**6.7**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS8_2m	ASS8_2.25m	ASS8_2.5m	ASS8_2.75m	ASS8_3m
			Sampling date / time	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2200878-012	EP2200878-013	EP2200878-014	EP2200878-015	EP2200878-016
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**9.2**	**9.0**	**8.4**	**9.0**	**9.0**
pH (Fox)	----	0.1	pH Unit	**6.8**	**6.8**	**6.8**	**6.9**	**7.0**
Reaction Rate	----	1	-	**Slight**	**Moderate**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC1	----	----	----	----
			Sampling date / time	24-Jan-2022 12:30	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2200878-017	--------	--------	--------	--------
				Result	----	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	-	mg/L	**Not Authorised**	----	----	----	----
Cadmium	7440-43-9	-	mg/L	**Not Authorised**	----	----	----	----
Chromium	7440-47-3	-	mg/L	**Not Authorised**	----	----	----	----
Copper	7440-50-8	-	mg/L	**Not Authorised**	----	----	----	----
Nickel	7440-02-0	-	mg/L	**Not Authorised**	----	----	----	----
Lead	7439-92-1	-	mg/L	**Not Authorised**	----	----	----	----
Zinc	7440-66-6	-	mg/L	**Not Authorised**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids
(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids
(SOIL) EP231C: Perfluoroalkyl Sulfonamides
(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids
(SOIL) EP231P: PFAS Sums
(SOIL) EP262: Ethanolamines
(WATER) EP066: Polychlorinated Biphenyls (PCB)
(WATER) EP068A: Organochlorine Pesticides (OC)
(WATER) EP068B: Organophosphorus Pesticides (OP)
(WATER) EP075(SIM)B: Polynuclear Aromatic Hydrocarbons
(WATER) EP262: Ethanolamines
(WATER) EP231A: Perfluoroalkyl Sulfonic Acids
(WATER) EP231B: Perfluoroalkyl Carboxylic Acids
(WATER) EP231C: Perfluoroalkyl Sulfonamides
(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids
(WATER) EP231P: PFAS Sums

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology). Only applies to samples EP2200878 (017).

(WATER) EP080/071: Total Petroleum Hydrocarbons
(WATER) EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions
(WATER) EP080: BTEXN

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2200878**	Page	: 1 of 3
Amendment	: **(Preliminary Report)**		
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 724-PEREN295751 PERDAMAN	Date Samples Received	: 27-Jan-2022
Order number	: ----	Date Analysis Commenced	: 27-Jan-2022
C-O-C number	: ----	Issue Date	: 28-Jan-2022
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 19		
No. of samples analysed	: 18		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA037: Ass Field Screening Analysis (QC Lot: 4142897)									
EP2200878-004	ASS8_0m	EA037: pH (F)	----	0.1	pH Unit	8.1	8.1	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.9	6.9	0.0	0% - 20%
EP2200878-013	ASS8_2.25m	EA037: pH (F)	----	0.1	pH Unit	9.0	9.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.8	6.8	0.0	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4142573)									
EP2200878-001	SS23_0m	EA055: Moisture Content	----	0.1	%	----	----	----	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 4142720)									
EP2200851-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	----	----	----	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	----	----	----	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	----	----	----	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	----	----	----	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	----	----	----	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	----	----	----	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	----	----	----	No Limit
EP2200891-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	----	----	----	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	----	----	----	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	----	----	----	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	----	----	----	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	----	----	----	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	----	----	----	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	----	----	----	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 4142720)							
EP2200851-002	Anonymous	EG020A-T: Arsenic	7440-38-2	----		70.0	130
		EG020A-T: Cadmium	7440-43-9	----		70.0	130
		EG020A-T: Chromium	7440-47-3	----		70.0	130
		EG020A-T: Copper	7440-50-8	----		70.0	130
		EG020A-T: Lead	7439-92-1	----		70.0	130
		EG020A-T: Nickel	7440-02-0	----		70.0	130
		EG020A-T: Zinc	7440-66-6	----		70.0	130

- **No Matrix Spike (MS) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2200878**	Page	: 1 of 8
Amendment	: **(Preliminary Report)**		
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 724-PEREN295751 PERDAMAN	Date Samples Received	: 27-Jan-2022
Site	: ----	Issue Date	: 28-Jan-2022
Sampler	: Nick Taylor	No. of samples received	: 19
Order number	: ----	No. of samples analysed	: 18

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Due for extraction	Days overdue	Analysis: Date analysed	Due for analysis	Days overdue
EA037: Ass Field Screening Analysis							
Snap Lock Bag							
ASS8_0m,	ASS8_0.25m,	27-Jan-2022	25-Jan-2022	**2**	27-Jan-2022	25-Jan-2022	**2**
ASS8_0.5m,	ASS8_0.75m,						
ASS8_1.00m,	ASS8_1.25m,						
ASS8_1.5m,	ASS8_1.75m,						
ASS8_2m,	ASS8_2.25m,						
ASS8_2.5m,	ASS8_2.75m,						
ASS8_3m							

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis								
Snap Lock Bag (EA037)								
ASS8_0m,	ASS8_0.25m,	**24-Jan-2022**	**27-Jan-2022**	25-Jan-2022	×	**27-Jan-2022**	25-Jan-2022	×
ASS8_0.5m,	ASS8_0.75m,							
ASS8_1.00m,	ASS8_1.25m,							
ASS8_1.5m,	ASS8_1.75m,							
ASS8_2m,	ASS8_2.25m,							
ASS8_2.5m,	ASS8_2.75m,							
ASS8_3m								
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
SS23_0m,	SS23_0.5m	**24-Jan-2022**	**----**	----	----	**Not Authorised**	07-Feb-2022	✓
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
SS23_0m,	SS23_0.5m	**24-Jan-2022**	**28-Jan-2022**	23-Jul-2022	✓	**Not Authorised**	23-Jul-2022	----
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
SS23_0m,	SS23_0.5m	**24-Jan-2022**	**28-Jan-2022**	21-Feb-2022	✓	**Not Authorised**	21-Feb-2022	----

(Preliminary Report)

Work Order : EP2200878
Client : Tetra Tech Coffey Pty Ltd
Project : 724-PEREN295751 PERDAMAN

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
SS23_0m, SS23_0.5m	**24-Jan-2022**	**----**	23-Jul-2022	----	**Not Authorised**	01-Sep-2022	----
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
SS23_0m, SS23_0.5m	**24-Jan-2022**	**----**	23-Jul-2022	----	**Not Authorised**	01-Sep-2022	----
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
SS23_0m, SS23_0.5m	**24-Jan-2022**	**----**	23-Jul-2022	----	**Not Authorised**	01-Sep-2022	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
SS23_0m, SS23_0.5m	**24-Jan-2022**	**----**	23-Jul-2022	----	**Not Authorised**	01-Sep-2022	----
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
SS23_0m, SS23_0.5m	**24-Jan-2022**	**----**	23-Jul-2022	----	**Not Authorised**	01-Sep-2022	----
EP262: Ethanolamines							
Soil Glass Jar - Unpreserved (EP262)							
SS23_0m, SS23_0.5m	**24-Jan-2022**	**----**	----	----	**Not Authorised**	07-Feb-2022	----

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
QC1	**24-Jan-2022**	**28-Jan-2022**	23-Jul-2022	✓	**Not Authorised**	23-Jul-2022	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG035T)							
QC1	**24-Jan-2022**	**----**	----	----	**Not Authorised**	21-Feb-2022	----
EP066: Polychlorinated Biphenyls (PCB)							
Amber Glass Bottle - Unpreserved (EP066)							
QC1	**24-Jan-2022**	**----**	31-Jan-2022	----	**Not Authorised**	12-Mar-2022	----
EP068A: Organochlorine Pesticides (OC)							
Amber Glass Bottle - Unpreserved (EP068)							
QC1	**24-Jan-2022**	**----**	31-Jan-2022	----	**Not Authorised**	12-Mar-2022	----
EP068B: Organophosphorus Pesticides (OP)							
Amber Glass Bottle - Unpreserved (EP068)							
QC1	**24-Jan-2022**	**----**	31-Jan-2022	----	**Not Authorised**	12-Mar-2022	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
QC1	**24-Jan-2022**	**----**	31-Jan-2022	----	**Not Authorised**	12-Mar-2022	----

(Preliminary Report)

Work Order : EP2200878
Client : Tetra Tech Coffey Pty Ltd
Project : 724-PEREN295751 PERDAMAN

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) QC1	**24-Jan-2022**	**----**	31-Jan-2022	----	**Not Authorised**	12-Mar-2022	----
Amber Glass Bottle - Unpreserved (EP071) QC2	**24-Jan-2022**	**28-Jan-2022**	31-Jan-2022	✓	**Not Authorised**	09-Mar-2022	----
Amber VOC Vial - Sulfuric Acid (EP080) QC1, QC2	**24-Jan-2022**	**----**	07-Feb-2022	----	**Not Authorised**	07-Feb-2022	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) QC1	**24-Jan-2022**	**----**	31-Jan-2022	----	**Not Authorised**	12-Mar-2022	----
Amber Glass Bottle - Unpreserved (EP071) QC2	**24-Jan-2022**	**28-Jan-2022**	31-Jan-2022	✓	**Not Authorised**	09-Mar-2022	----
Amber VOC Vial - Sulfuric Acid (EP080) QC1, QC2	**24-Jan-2022**	**----**	07-Feb-2022	----	**Not Authorised**	07-Feb-2022	----
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) QC1, QC2	**24-Jan-2022**	**----**	07-Feb-2022	----	**Not Authorised**	07-Feb-2022	----
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) QC1, TBW44	**24-Jan-2022**	**----**	23-Jul-2022	----	**Not Authorised**	23-Jul-2022	----
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-SUT) QC1, TBW44	**24-Jan-2022**	**----**	23-Jul-2022	----	**Not Authorised**	23-Jul-2022	----
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-SUT) QC1, TBW44	**24-Jan-2022**	**----**	23-Jul-2022	----	**Not Authorised**	23-Jul-2022	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) QC1, TBW44	**24-Jan-2022**	**----**	23-Jul-2022	----	**Not Authorised**	23-Jul-2022	----
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-SUT) QC1, TBW44	**24-Jan-2022**	**----**	23-Jul-2022	----	**Not Authorised**	23-Jul-2022	----
EP262: Ethanolamines							
Amber Glass Bottle - Unpreserved (EP262) QC1	**24-Jan-2022**	**----**	----	----	**Not Authorised**	31-Jan-2022	----

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Total Metals by ICP-MS - Suite A	EG020A-T	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines in Soils	EP262	SOIL	In House: 2g of soil is extracted into 10 mL of water then analysed by analysed by LC/MSMS in ESI Positive Mode.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is concentrated, combined with an equal volume of reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines by LCMSMS	EP262	WATER	In house: LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES — Mobile: 0407 817 762 — Email: bernie.weekes@coffey.com
Invoices to: COFFEY ACCOUNTS — Phone: — Email: @tetratech.com

Project No: 754-PERGN295751 — Task No: LAB
Project Name: PERDAMAN — Laboratory: ALS
Sampler's Name: NICK TAYLOR — Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	METALS S2	PFAS EP231X	MDEA EP262	EA037	HOLD	NOTES
1	SS23_0m	24/1/22	11:00am	SOIL	2J, 1P, 2Z	5 DAYS	X	X	X			PLEASE PROVIDE ASS RESULTS FOR REVIEW FOR FURTHER ANALYSIS (SPOCAS & CRS)
2	SS23_0.5m	↓	↓	↓	2J, 1P, 2Z	↓	X	X	X			
3	SS23_1.0m	↓	↓	↓	2J, 1P	↓					X	
4	AS58_0m									X		
5	AS58_0.25m									X		
6	AS58_0.5m									X		
7	AS58_0.75m									X		
8	AS58_1.0m									X		
9	AS58_1.25m									X		
10	AS58_1.5m									X		
11	AS58_1.75m									X		
12	AS58_2m									X		
13	AS58_2.25m									X		
14	AS58_2.5m									X		
15	AS58_2.75m									X		
16	AS58_3m									X		

EMAIL EA037 RESULTS TO BERNIE ASAP

Environmental Division Perth
Work Order Reference
EP2200878
Telephone : -- 61-8-9406 1301

RELINQUISHED BY		RECEIVED BY	
Name: NICK TAYLOR	Date: 25/1/22	Name: LOUFFY	Date: 27/1
Coffey	Time: 12:00pm	Company: ALS	Time: 1030
Name:	Date:	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)
- All Samples Recieved in Good Condition ☐
- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2200961**	Page	: 1 of 5
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 27-Jan-2022 10:30
Order number	: ----	Date Analysis Commenced	: 03-Feb-2022
C-O-C number	: ----	Issue Date	: 04-Feb-2022 16:53
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- This work order is a Rebatch of EP2200878.
- ALS is not NATA accredited for EA033 using unpulverised sample. Analysis for sample #5 and #6 as per client request.
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime ($CaCO_3$) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime ($CaCO_3$) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil, multiply reported results x wet bulk density of soil in t/m3.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS8_0.25	ASS8_1.25	ASS8_1.75	ASS8_2.75	ASS8_0.25 Unground
			Sampling date / time	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2200961-001	EP2200961-002	EP2200961-003	EP2200961-004	EP2200961-005
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	9.5	----	9.4	----
pH OX (23B)	----	0.1	pH Unit	----	8.2	----	8.2	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	<2	----	<2	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	----	<0.005	----	<0.005	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	----	<0.005	----	<0.005	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	----	<0.005	----	<0.005	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	----	0.058	----	0.038	----
Peroxide Sulfur (23De)	----	0.005	% S	----	0.070	----	0.038	----
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	----	0.012	----	<0.005	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	----	7	----	<5	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	----	0.258	----	0.251	----
Peroxide Calcium (23Wh)	----	0.005	% Ca	----	22.7	----	22.2	----
Acid Reacted Calcium (23X)	----	0.005	% Ca	----	22.4	----	22.0	----
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	----	11200	----	11000	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	----	18.0	----	17.6	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	----	0.085	----	0.063	----
Peroxide Magnesium (23Tm)	----	0.005	% Mg	----	0.523	----	0.328	----
Acid Reacted Magnesium (23U)	----	0.005	% Mg	----	0.437	----	0.266	----
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	----	360	----	218	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	----	0.577	----	0.350	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	----	50.2	----	50.4	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	10000	----	10100	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS8_0.25	ASS8_1.25	ASS8_1.75	ASS8_2.75	ASS8_0.25 Unground
			Sampling date / time	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2200961-001	EP2200961-002	EP2200961-003	EP2200961-004	EP2200961-005
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	----	16.0	----	16.1	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	1	----	<1	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	9.5	----	9.5	----	9.4
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	41.4	----	51.3	----	36.2
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	8280	----	10200	----	7220
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	13.3	----	16.4	----	11.6
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	----	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS8_1.75 Unground	----	----	----	----
			Sampling date / time	24-Jan-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2200961-006	--------	--------	--------	--------
				Result	----	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.6**	----	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**44.8**	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**8950**	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**14.3**	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	----	----	----

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2200961**	Page	: 1 of 6
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 27-Jan-2022
Order number	: ----	Date Analysis Commenced	: 03-Feb-2022
C-O-C number	: ----	Issue Date	: 04-Feb-2022
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 6		
No. of samples analysed	: 6		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA029-A: pH Measurements (QC Lot: 4152461)									
EP2200961-002	ASS8_1.25	EA029: pH KCl (23A)	----	0.1	pH Unit	9.5	9.5	0.0	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	8.2	8.2	0.0	0% - 20%
EA029-B: Acidity Trail (QC Lot: 4152461)									
EP2200961-002	ASS8_1.25	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EA029-C: Sulfur Trail (QC Lot: 4152461)									
EP2200961-002	ASS8_1.25	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.058	0.056	4.4	0% - 50%
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.070	0.067	4.5	0% - 50%
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.012	0.011	0.0	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	7	7	0.0	No Limit
EA029-D: Calcium Values (QC Lot: 4152461)									
EP2200961-002	ASS8_1.25	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.258	0.262	1.6	0% - 20%
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	22.7	22.3	1.7	0% - 20%
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	22.4	22.1	1.7	0% - 20%
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	18.0	17.6	1.7	0% - 20%
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	11200	11000	1.7	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA029-E: Magnesium Values (QC Lot: 4152461)									
EP2200961-002	ASS8_1.25	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.085	0.086	1.3	0% - 50%
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.523	0.517	1.0	0% - 20%
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	0.437	0.431	1.5	0% - 20%
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	0.577	0.568	1.5	0% - 20%
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	360	354	1.5	0% - 20%
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 4152461)									
EP2200961-002	ASS8_1.25	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	50.2	50.1	0.2	0% - 20%
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	16.0	16.0	0.2	0% - 20%
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	10000	10000	0.2	0% - 20%
EA029-H: Acid Base Accounting (QC Lot: 4152461)									
EP2200961-002	ASS8_1.25	EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-A: Actual Acidity (QC Lot: 4152460)									
EP2200961-001	ASS8_0.25	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.5	9.5	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 4152460)									
EP2200961-001	ASS8_0.25	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 4152460)									
EP2200961-001	ASS8_0.25	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	41.4	41.2	0.5	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	13.3	13.2	0.5	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	8280	8240	0.5	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 4152460)									
EP2200961-001	ASS8_0.25	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-E: Acid Base Accounting (QC Lot: 4152460) - continued									
EP2200961-001	ASS8_0.25	EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA029-A: pH Measurements (QCLot: 4152461)								
EA029: pH KCl (23A)	----	----	pH Unit	----	5.047 pH Unit	96.1	94.3	105
EA029: pH OX (23B)	----	----	pH Unit	----	3.5615 pH Unit	101	91.7	120
EA029-B: Acidity Trail (QCLot: 4152461)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	105	80.4	108
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	55.0798 mole H+ / t	103	91.1	117
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 4152461)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	0.05325 % S	109	75.8	130
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	0.158 % S	90.9	81.7	122
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 4152461)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.020	0.22305 % Ca	98.8	84.5	128
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.020	0.2064 % Ca	102	82.6	119
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values (QCLot: 4152461)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	0.12082 % Mg	89.0	77.5	120
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.020	0.18219 % Mg	101	80.6	111
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	----	----	----	----
EA033-A: Actual Acidity (QCLot: 4152460)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	105	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 4152460)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	97.0	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 4152460)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EA033-C: Acid Neutralising Capacity (QCLot: 4152460) - continued								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 4152460)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2200961**	Page	: 1 of 5
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 27-Jan-2022
Site	: ----	Issue Date	: 04-Feb-2022
Sampler	: Nick Taylor	No. of samples received	: 6
Order number	: ----	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-A: pH Measurements								
80* dried soil (EA029)								
ASS8_1.25,	ASS8_2.75	**24-Jan-2022**	**03-Feb-2022**	19-Oct-2024	✓	**03-Feb-2022**	04-May-2022	✓
EA029-B: Acidity Trail								
80* dried soil (EA029)								
ASS8_1.25,	ASS8_2.75	**24-Jan-2022**	**03-Feb-2022**	19-Oct-2024	✓	**03-Feb-2022**	04-May-2022	✓
EA029-C: Sulfur Trail								
80* dried soil (EA029)								
ASS8_1.25,	ASS8_2.75	**24-Jan-2022**	**03-Feb-2022**	19-Oct-2024	✓	**03-Feb-2022**	04-May-2022	✓
EA029-D: Calcium Values								
80* dried soil (EA029)								
ASS8_1.25,	ASS8_2.75	**24-Jan-2022**	**03-Feb-2022**	19-Oct-2024	✓	**03-Feb-2022**	04-May-2022	✓
EA029-E: Magnesium Values								
80* dried soil (EA029)								
ASS8_1.25,	ASS8_2.75	**24-Jan-2022**	**03-Feb-2022**	19-Oct-2024	✓	**03-Feb-2022**	04-May-2022	✓
EA029-F: Excess Acid Neutralising Capacity								
80* dried soil (EA029)								
ASS8_1.25,	ASS8_2.75	**24-Jan-2022**	**03-Feb-2022**	19-Oct-2024	✓	**03-Feb-2022**	04-May-2022	✓
EA029-G: Retained Acidity								
80* dried soil (EA029)								
ASS8_1.25,	ASS8_2.75	**24-Jan-2022**	**03-Feb-2022**	19-Oct-2024	✓	**03-Feb-2022**	04-May-2022	✓
EA029-H: Acid Base Accounting								
80* dried soil (EA029)								
ASS8_1.25,	ASS8_2.75	**24-Jan-2022**	**03-Feb-2022**	19-Oct-2024	✓	**03-Feb-2022**	04-May-2022	✓
EA033-A: Actual Acidity								
80* dried soil (EA033)								
ASS8_0.25, ASS8_0.25 - Unground,	ASS8_1.75, ASS8_1.75 - Unground	**24-Jan-2022**	**03-Feb-2022**	24-Jan-2023	✓	**03-Feb-2022**	04-May-2022	✓
EA033-B: Potential Acidity								
80* dried soil (EA033)								
ASS8_0.25, ASS8_0.25 - Unground,	ASS8_1.75, ASS8_1.75 - Unground	**24-Jan-2022**	**03-Feb-2022**	24-Jan-2023	✓	**03-Feb-2022**	04-May-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity							
80* dried soil (EA033) ASS8_0.25, ASS8_1.75, ASS8_0.25 - Unground, ASS8_1.75 - Unground	**24-Jan-2022**	**03-Feb-2022**	24-Jan-2023	✓	**03-Feb-2022**	04-May-2022	✓
EA033-D: Retained Acidity							
80* dried soil (EA033) ASS8_0.25, ASS8_1.75, ASS8_0.25 - Unground, ASS8_1.75 - Unground	**24-Jan-2022**	**03-Feb-2022**	24-Jan-2023	✓	**03-Feb-2022**	04-May-2022	✓
EA033-E: Acid Base Accounting							
80* dried soil (EA033) ASS8_0.25, ASS8_1.75, ASS8_0.25 - Unground, ASS8_1.75 - Unground	**24-Jan-2022**	**03-Feb-2022**	24-Jan-2023	✓	**03-Feb-2022**	04-May-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	In house: Referenced to Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Lewis Duffy

From: Weekes, Bernie <BERNIE.WEEKES@coffey.com>
Sent: Friday, 28 January 2022 1:04 PM
To: ALS Enviro Perth
Cc: Samples Perth; Lauren Biagioni
Subject: [EXTERNAL] - RE: RESULTS & EDD for ALS Workorder : EP2200878 | Your Reference: 724-PEREN295751 PERDAMAN

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: Client Services

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi,
I have reviewed the prelim results and request further testing as per below instructions.

1/5 ASS8_0.25: Split sample and test EA033-WA on both ground and unground portions to determine variation in ANC
2 ASS8_1.25: EA029-WA
3/6 ASS8_1.75: Split sample and test EA033-WA on both ground and unground portions to determine variation in ANC
4 ASS8_2.75: EA033-WA

Regards,

Bernie Weekes, GradCertProjMgt, BSc (EnvMgt)/BBus | Principal Environmental Consultant
Mobile **+61 407 817 762** Business **+61 8 6218 2161** | bernie.weekes@tetratech.com

From: angel-no-reply@alsglobal.com <angel-no-reply@alsglobal.com>
Sent: Friday, January 28, 2022 10:58 AM
To: Weekes, Bernie <BERNIE.WEEKES@coffey.com>
Subject: RESULTS & EDD for ALS Workorder : EP2200878 | Your Reference: 724-PEREN295751 PERDAMAN

⚠ **CAUTION:** This email originated from an external sender. Verify the source before opening links or attachments. ⚠

ALS

Environmental Division
Perth
Work Order Reference
EP2200961

Deliverables for ALS Workorder EP2200878

Project: 724-PEREN295751 PERDAMAN

Telephone : -- 61-8-9406 1301

Dear Bernie Weekes,

Please find enclosed the following deliverables for **EP2200878**:

- 724-PEREN295751 PERDAMAN.ESDAT_EP2200878_0.Chemistry2e.CSV
- 724-PEREN295751 PERDAMAN.ESDAT_EP2200878_0.Header.XML
- 724-PEREN295751 PERDAMAN.ESDAT_EP2200878_0.Sample2e.CSV
- EP2200878_0_COA (Preliminary Report - 2022-Jan-28--10-54-28) .pdf
- EP2200878_0_XTAB.XLS
- EP2200878_0_QC.pdf
- EP2200878_0_QCI.pdf
- EP2200878_COC.pdf

Report Recipients

- Bernie Weekes
  - 724-PEREN295751 PERDAMAN.ESDAT_EP2200878_0.Chemistry2e.CSV
  - 724-PEREN295751 PERDAMAN.ESDAT_EP2200878_0.Header.XML
  - 724-PEREN295751 PERDAMAN.ESDAT_EP2200878_0.Sample2e.CSV
  - EP2200878_0_COA (Preliminary Report - 2022-Jan-28--10-54-28) .pdf (Email)
  - EP2200878_0_XTAB.XLS
  - EP2200878_0_QC.pdf (Email)
  - EP2200878_0_QCI.pdf (Email)
  - EP2200878_COC.pdf (Email)

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES — Mobile: 0407 817 762 — Email: bernie.weekes@coffey.com
Invoices to: COFFEY ACCOUNTS — Phone: — Email: @tetratech.com

Project No: 754_PERGN295751 — Task No: LAB
Project Name: PERDAMAN — Laboratory: ALS
Sampler's Name: NICK TAYLOR — Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	METALS S2	PFAS EP231X	MDEA EP262	EA037	Phs	HOLD	NOTES
1	SS23_0m	24/1/22	11:00AM	SOIL	2J, 1P, 2Z	5 DAYS	X	X	X				
2	SS23_0.5m	↓	↓	↓	2J, 1P, 2Z	↓	X	X	X				PLEASE PROVIDE
3	SS23_1.0m	↓	↓	↓	2J, 1P	↓						X	ASS RESULTS
(1)(5) 4	ASS8_0m									X			FOR REVIEW
(5)	ASS8_0.25m									X			FOR FURTHER
6	ASS8_0.5m									X			ANALYSIS
7	ASS8_0.75m									X			(SPOCAS & CRS)
8	ASS8_1.0m									X			
(2) (9)	ASS8_1.25m									X			EMAIL
10	ASS8_1.5m									X			EA037 RESULTS
(3)(6) (11)	ASS8_1.75m									X			TO BERNIE ASAP
12	ASS8_2m									X			
13	ASS8_2.25m									X			
14	ASS8_2.5m									X			
(4) (15)	ASS8_2.75m									X			
16	ASS8_3m									X			

Environmental Division
Perth
Work Order Reference
EP2200878

Telephone : – 61-8-9406 1301

RELINQUISHED BY		RECEIVED BY	
Name: NICK TAYLOR	Date: 25/1/22 →	Name: LOUFFY	Date: 27/1
Coffey	Time: 12:00PM	Company: ALS	Time: 1030
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)
All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES
Invoices to: COFFEY ACCOUNTS
Mobile: 0407 817 762
Phone:
Email: bernie.weekes@coffey.com ~~@tetratech.com~~
Email: @tetratech.com

Project No: 754 - PERENJ295751
Task No: LAB
Project Name: PERDAMAN
Laboratory: ALS
Sampler's Name: NICK TAYLOR
Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices):
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS EP231X	MDEA EP262	~~[illegible]~~	W16T	W04									NOTES
17	QC1	24/1/22	12:30pm	WATER	1G,3P,2V	5 DAY	X	X		X										
18	QC2	24/1/22	12:30pm	WATER	1G,2V	5 DAY					X									PLEASE FILTER METALS.

RELINQUISHED BY		RECEIVED BY	
Name: NICK TAYLOR	Date: 25/1/22 →	Name:	Date:
Coffey	Time: 12:00pm	Company:	Time:
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)
All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

***Container Type & Preservation Codes:** P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES
Invoices to: COFFEY ACCOUNTS

Mobile: 0407 817 762
Phone:

Email: bernie.weekes@coffey.com ~~@tetratech.com~~
Email: @tetratech.com

Project No: 754_PERFN295751
Task No: LAB
Project Name: PERDAMAN
Laboratory: ALS
Sampler's Name: NICK TAYLOR
Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices):
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS EP231X	MDEA EP262	~~[illegible]~~	W16T	W04									NOTES
17	QC1	24/1/22	12:30pm	WATER	1G,3P,2V	5 DAY	X	X		X										
18	QC2	24/1/22	12:30pm	WATER	1G,2V	5 DAY					X									PLEASE FILTER METALS.

RELINQUISHED BY		RECEIVED BY	
Name: NICK TAYLOR	Date: 25/1/22 →	Name:	Date:
Coffey	Time: 12:00pm.	Company:	Time:
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)
All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201247**	Page	: 1 of 13
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 31-Jan-2022 11:45
Order number	: ----	Date Analysis Commenced	: 08-Feb-2022
C-O-C number	: ----	Issue Date	: 11-Feb-2022 16:19
Sampler	: ----		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 32		
No. of samples analysed	: 32		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ALS is not NATA accredited for the analysis of EA033-WA on an unpulversised sample.
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- This is a rebatch of EP2201003.
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil, multiply reported results x wet bulk density of soil in t/m3.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS18_0.25	ASS18_0.75	ASS14_0.0	ASS14_0.5	ASS12_0.0
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201247-001	EP2201247-002	EP2201247-003	EP2201247-004	EP2201247-005
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	9.7	----	9.8	----
pH OX (23B)	----	0.1	pH Unit	----	8.0	----	8.0	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	<2	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	<2	----	<2	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	----	<0.005	----	<0.005	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	----	<0.005	----	<0.005	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	----	<0.005	----	<0.005	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	----	0.046	----	0.065	----
Peroxide Sulfur (23De)	----	0.005	% S	----	0.058	----	0.078	----
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	----	0.011	----	0.014	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	----	7	----	8	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	----	0.152	----	0.149	----
Peroxide Calcium (23Wh)	----	0.005	% Ca	----	23.3	----	3.48	----
Acid Reacted Calcium (23X)	----	0.005	% Ca	----	23.2	----	3.33	----
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	----	11600	----	1660	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	----	18.5	----	2.67	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	----	0.040	----	0.061	----
Peroxide Magnesium (23Tm)	----	0.005	% Mg	----	0.387	----	0.332	----
Acid Reacted Magnesium (23U)	----	0.005	% Mg	----	0.347	----	0.271	----
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	----	285	----	223	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	----	0.458	----	0.358	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	----	60.4	----	10.0	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	12100	----	2010	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	----	19.3	----	3.22	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS18_0.25	ASS18_0.75	ASS14_0.0	ASS14_0.5	ASS12_0.0
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201247-001	EP2201247-002	EP2201247-003	EP2201247-004	EP2201247-005
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**----**	**1.5**	**----**	**1.5**	**----**
Net Acidity (sulfur units)	----	0.02	% S	**----**	<0.02	**----**	<0.02	**----**
Net Acidity (acidity units)	----	10	mole H+ / t	**----**	<10	**----**	<10	**----**
Liming Rate	----	1	kg CaCO3/t	**----**	<1	**----**	<1	**----**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**----**	<0.02	**----**	<0.02	**----**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**----**	<10	**----**	<10	**----**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**----**	**1**	**----**	**1**	**----**
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.3**	**----**	**9.4**	**----**	**9.3**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	**----**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	**----**	**0.024**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	**----**	**15**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**48.9**	**----**	**60.3**	**----**	**48.3**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**9770**	**----**	**12000**	**----**	**9650**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**15.7**	**----**	**19.3**	**----**	**15.5**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	**----**	**0.02**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	**----**	**15**
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	**----**	**1**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS12_0.5	ASS12_1.5	ASS12_2.5	ASS11_0.25	ASS11_1.0
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201247-006	EP2201247-007	EP2201247-008	EP2201247-009	EP2201247-010
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	9.7	----	----	----	9.6
pH OX (23B)	----	0.1	pH Unit	8.1	----	----	----	7.8
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	----	----	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	<0.005	----	----	----	<0.005
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	<0.005	----	----	----	<0.005
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	<0.005	----	----	----	<0.005
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	0.130	----	----	----	0.020
Peroxide Sulfur (23De)	----	0.005	% S	0.224	----	----	----	0.022
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	0.094	----	----	----	<0.005
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	59	----	----	----	<5
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	0.206	----	----	----	0.091
Peroxide Calcium (23Wh)	----	0.005	% Ca	16.4	----	----	----	0.794
Acid Reacted Calcium (23X)	----	0.005	% Ca	16.2	----	----	----	0.703
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	8100	----	----	----	351
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	13.0	----	----	----	0.562
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	0.123	----	----	----	0.034
Peroxide Magnesium (23Tm)	----	0.005	% Mg	1.11	----	----	----	0.147
Acid Reacted Magnesium (23U)	----	0.005	% Mg	0.990	----	----	----	0.114
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	814	----	----	----	94
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	1.30	----	----	----	0.150
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	43.3	----	----	----	2.87
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	8650	----	----	----	574
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	13.8	----	----	----	0.919

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS12_0.5	ASS12_1.5	ASS12_2.5	ASS11_0.25	ASS11_1.0
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201247-006	EP2201247-007	EP2201247-008	EP2201247-009	EP2201247-010
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.09**	----	----	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**59**	----	----	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	**4**	----	----	----	<1
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	**9.4**	**9.2**	**9.3**	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	<2	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	<0.02	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	**0.006**	<0.005	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	<10	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	**68.7**	**45.4**	**47.0**	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	**13700**	**9070**	**9390**	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	**22.0**	**14.5**	**15.0**	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	**1.5**	**1.5**	**1.5**	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	<0.02	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	<10	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	<1	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	<0.02	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	<10	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	<1	<1	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS10_0.25	ASS10_1.75	ASS10_2.25	ASS10_2.75	ASS9_0.0
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201247-011	EP2201247-012	EP2201247-013	EP2201247-014	EP2201247-015
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	9.5	----	----	----	9.5
pH OX (23B)	----	0.1	pH Unit	8.0	----	----	----	8.0
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	----	----	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	<0.005	----	----	----	<0.005
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	<0.005	----	----	----	<0.005
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	<0.005	----	----	----	<0.005
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	0.137	----	----	----	0.303
Peroxide Sulfur (23De)	----	0.005	% S	0.181	----	----	----	0.319
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	0.044	----	----	----	0.016
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	27	----	----	----	10
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	0.198	----	----	----	0.304
Peroxide Calcium (23Wh)	----	0.005	% Ca	8.40	----	----	----	8.82
Acid Reacted Calcium (23X)	----	0.005	% Ca	8.20	----	----	----	8.52
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	4090	----	----	----	4250
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	6.56	----	----	----	6.82
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	0.166	----	----	----	0.138
Peroxide Magnesium (23Tm)	----	0.005	% Mg	1.08	----	----	----	1.01
Acid Reacted Magnesium (23U)	----	0.005	% Mg	0.914	----	----	----	0.869
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	752	----	----	----	715
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	1.20	----	----	----	1.15
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	25.8	----	----	----	26.4
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	5160	----	----	----	5260
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	8.27	----	----	----	8.43

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS10_0.25	ASS10_1.75	ASS10_2.25	ASS10_2.75	ASS9_0.0
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201247-011	EP2201247-012	EP2201247-013	EP2201247-014	EP2201247-015
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.04**	----	----	----	**0.02**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**27**	----	----	----	**10**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**2**	----	----	----	**1**
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	**9.2**	**9.2**	**9.2**	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	<2	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	<0.02	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	<0.005	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	<10	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	**36.4**	**33.8**	**23.4**	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	**7270**	**6760**	**4660**	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	**11.6**	**10.8**	**7.48**	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	**1.5**	**1.5**	**1.5**	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	<0.02	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	<10	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	<1	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	<0.02	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	<10	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	<1	<1	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS9_0.5	ASS9_1.0	ASS9_2.5	QC7	QC9
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201247-016	EP2201247-017	EP2201247-018	EP2201247-019	EP2201247-020
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	----	----	9.4	9.6
pH OX (23B)	----	0.1	pH Unit	----	----	----	7.9	8.0
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	<2	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	----	<2	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	----	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	----	----	----	<0.005	<0.005
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	----	----	----	<0.005	<0.005
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	----	----	----	<0.005	<0.005
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	----	----	----	0.016	0.291
Peroxide Sulfur (23De)	----	0.005	% S	----	----	----	0.016	0.389
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	----	----	----	<0.005	0.097
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	----	----	----	<5	61
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	----	----	----	0.109	0.275
Peroxide Calcium (23Wh)	----	0.005	% Ca	----	----	----	0.441	13.3
Acid Reacted Calcium (23X)	----	0.005	% Ca	----	----	----	0.332	13.0
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	----	----	----	166	6490
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	----	----	----	0.266	10.4
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	----	----	----	0.028	0.227
Peroxide Magnesium (23Tm)	----	0.005	% Mg	----	----	----	0.076	1.55
Acid Reacted Magnesium (23U)	----	0.005	% Mg	----	----	----	0.049	1.33
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	----	----	----	40	1090
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	----	----	----	0.064	1.75
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	----	----	----	1.45	38.5
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	----	----	289	7690
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	----	----	----	0.463	12.3

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS9_0.5	ASS9_1.0	ASS9_2.5	QC7	QC9
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201247-016	EP2201247-017	EP2201247-018	EP2201247-019	EP2201247-020
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	----	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	<10	<10
Liming Rate	----	1	kg CaCO3/t	----	----	----	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	----	----	<0.02	**0.10**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	----	----	<10	**61**
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	----	----	<1	**5**
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.3**	**9.5**	**9.5**	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	<0.005	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**48.7**	**51.2**	**40.1**	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**9730**	**10200**	**8020**	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**15.6**	**16.4**	**12.8**	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	----	----
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	<10	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	<1	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS18_0.25 unground portion	ASS14_0.0 unground portion	ASS12_0.0 unground portion	ASS12_1.5 unground portion	ASS12_2.5 unground portion
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201247-021	EP2201247-022	EP2201247-023	EP2201247-024	EP2201247-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	9.5	9.7	9.5	9.7	9.4
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.027	<0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	17	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	44.8	49.3	44.9	61.6	36.1
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	8960	9840	8970	12300	7210
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	14.4	15.8	14.4	19.7	11.6
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.03	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	17	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	1	<1	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS11_0.25 unground portion	ASS10_1.75 unground portion	ASS10_2.25 unground portion	ASS10_2.75 unground portion	ASS9_0.5 unground portion
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201247-026	EP2201247-027	EP2201247-028	EP2201247-029	EP2201247-030
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	9.4	9.5	9.5	9.4	9.7
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	<0.005	<0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	35.7	33.4	23.2	22.5	36.2
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	7140	6670	4640	4500	7240
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	11.4	10.7	7.44	7.22	11.6
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS9_1.0 unground portion	ASS9_2.5 unground portion	----	----	----
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201247-031	EP2201247-032	--------	--------	--------
				Result	Result	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.8**	**9.6**	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**36.6**	**41.9**	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**7320**	**8380**	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**11.7**	**13.4**	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	<1	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	----	----	----

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2201247**	Page	: 1 of 7
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 31-Jan-2022
Order number	: ----	Date Analysis Commenced	: 08-Feb-2022
C-O-C number	: ----	Issue Date	: 11-Feb-2022
Sampler	: ----		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 32		
No. of samples analysed	: 32		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA029-A: pH Measurements (QC Lot: 4166370)									
EP2201247-002	ASS18_0.75	EA029: pH KCl (23A)	----	0.1	pH Unit	9.7	9.7	0.0	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	8.0	8.0	0.0	0% - 20%
EA029-B: Acidity Trail (QC Lot: 4166370)									
EP2201247-002	ASS18_0.75	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EA029-C: Sulfur Trail (QC Lot: 4166370)									
EP2201247-002	ASS18_0.75	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.046	0.048	3.2	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.058	0.058	0.0	0% - 50%
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.011	0.010	15.4	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	7	6	0.0	No Limit
EA029-D: Calcium Values (QC Lot: 4166370)									
EP2201247-002	ASS18_0.75	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.152	0.157	2.7	0% - 20%
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	23.3	23.8	2.2	0% - 20%
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	23.2	23.7	2.2	0% - 20%
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	18.5	18.9	2.2	0% - 20%
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	11600	11800	2.2	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA029-E: Magnesium Values (QC Lot: 4166370)									
EP2201247-002	ASS18_0.75	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.040	0.041	3.7	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.387	0.406	4.8	0% - 20%
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	0.347	0.364	4.9	0% - 20%
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	0.458	0.481	4.9	0% - 20%
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	285	300	4.9	0% - 20%
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 4166370)									
EP2201247-002	ASS18_0.75	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	60.4	60.2	0.3	0% - 20%
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	19.3	19.3	0.3	0% - 20%
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	12100	12000	0.3	0% - 20%
EA029-H: Acid Base Accounting (QC Lot: 4166370)									
EP2201247-002	ASS18_0.75	EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	<1	0.0	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-A: Actual Acidity (QC Lot: 4166369)									
EP2201247-001	ASS18_0.25	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.3	9.3	0.0	0% - 20%
EP2201247-017	ASS9_1.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.5	9.6	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 4166371)									
EP2201247-029	ASS10_2.75 unground portion	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.4	9.4	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 4166369)									
EP2201247-001	ASS18_0.25	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2201247-017	ASS9_1.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA033-B: Potential Acidity (QC Lot: 4166371)									
EP2201247-029	ASS10_2.75 unground portion	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 4166369)									
EP2201247-001	ASS18_0.25	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	48.9	48.6	0.6	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	15.7	15.6	0.6	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	9770	9710	0.6	0% - 20%
EP2201247-017	ASS9_1.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	51.2	51.6	0.8	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	16.4	16.5	0.8	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	10200	10300	0.8	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 4166371)									
EP2201247-029	ASS10_2.75 unground portion	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	22.5	22.5	0.0	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	7.22	7.22	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	4500	4500	0.0	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 4166369)									
EP2201247-001	ASS18_0.25	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2201247-017	ASS9_1.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 4166371)									
EP2201247-029	ASS10_2.75 unground portion	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-E: Acid Base Accounting (QC Lot: 4166371) - continued									
EP2201247-029	ASS10_2.75 unground portion	EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA029-A: pH Measurements (QCLot: 4166370)								
EA029: pH KCl (23A)	----	----	pH Unit	----	5.047 pH Unit	96.5	94.3	105
EA029: pH OX (23B)	----	----	pH Unit	----	3.5615 pH Unit	105	91.7	120
EA029-B: Acidity Trail (QCLot: 4166370)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	93.4	80.4	108
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	55.0798 mole H+ / t	102	91.1	117
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 4166370)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	0.05325 % S	104	75.8	130
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	0.158 % S	90.5	81.7	122
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 4166370)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.020	0.22305 % Ca	88.8	84.5	128
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.020	0.2064 % Ca	95.6	82.6	119
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values (QCLot: 4166370)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	0.12082 % Mg	82.0	77.5	120
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.020	0.18219 % Mg	93.2	80.6	111
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	----	----	----	----
EA033-A: Actual Acidity (QCLot: 4166369)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	93.2	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 4166371)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	93.4	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EA033-B: Potential Acidity (QCLot: 4166369)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	101	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 4166371)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	94.0	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 4166369)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 4166371)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 4166369)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 4166371)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201247**	Page	: 1 of 7
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 31-Jan-2022
Site	: ----	Issue Date	: 11-Feb-2022
Sampler	: ----	No. of samples received	: 32
Order number	: ----	No. of samples analysed	: 32

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-A: pH Measurements								
Snap Lock Bag - frozen (EA029)								
ASS18_0.75,	ASS14_0.5,	**25-Jan-2022**	**08-Feb-2022**	20-Oct-2024	✓	**10-Feb-2022**	09-May-2022	✓
ASS12_0.5,	ASS11_1.0,							
ASS10_0.25,	ASS9_0.0,							
QC7,	QC9							
EA029-B: Acidity Trail								
Snap Lock Bag - frozen (EA029)								
ASS18_0.75,	ASS14_0.5,	**25-Jan-2022**	**08-Feb-2022**	20-Oct-2024	✓	**10-Feb-2022**	09-May-2022	✓
ASS12_0.5,	ASS11_1.0,							
ASS10_0.25,	ASS9_0.0,							
QC7,	QC9							
EA029-C: Sulfur Trail								
Snap Lock Bag - frozen (EA029)								
ASS18_0.75,	ASS14_0.5,	**25-Jan-2022**	**08-Feb-2022**	20-Oct-2024	✓	**10-Feb-2022**	09-May-2022	✓
ASS12_0.5,	ASS11_1.0,							
ASS10_0.25,	ASS9_0.0,							
QC7,	QC9							
EA029-D: Calcium Values								
Snap Lock Bag - frozen (EA029)								
ASS18_0.75,	ASS14_0.5,	**25-Jan-2022**	**08-Feb-2022**	20-Oct-2024	✓	**10-Feb-2022**	09-May-2022	✓
ASS12_0.5,	ASS11_1.0,							
ASS10_0.25,	ASS9_0.0,							
QC7,	QC9							
EA029-E: Magnesium Values								
Snap Lock Bag - frozen (EA029)								
ASS18_0.75,	ASS14_0.5,	**25-Jan-2022**	**08-Feb-2022**	20-Oct-2024	✓	**10-Feb-2022**	09-May-2022	✓
ASS12_0.5,	ASS11_1.0,							
ASS10_0.25,	ASS9_0.0,							
QC7,	QC9							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-F: Excess Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA029)								
ASS18_0.75,	ASS14_0.5,	**25-Jan-2022**	**08-Feb-2022**	20-Oct-2024	✓	**10-Feb-2022**	09-May-2022	✓
ASS12_0.5,	ASS11_1.0,							
ASS10_0.25,	ASS9_0.0,							
QC7,	QC9							
EA029-G: Retained Acidity								
Snap Lock Bag - frozen (EA029)								
ASS18_0.75,	ASS14_0.5,	**25-Jan-2022**	**08-Feb-2022**	20-Oct-2024	✓	**10-Feb-2022**	09-May-2022	✓
ASS12_0.5,	ASS11_1.0,							
ASS10_0.25,	ASS9_0.0,							
QC7,	QC9							
EA029-H: Acid Base Accounting								
Snap Lock Bag - frozen (EA029)								
ASS18_0.75,	ASS14_0.5,	**25-Jan-2022**	**08-Feb-2022**	20-Oct-2024	✓	**10-Feb-2022**	09-May-2022	✓
ASS12_0.5,	ASS11_1.0,							
ASS10_0.25,	ASS9_0.0,							
QC7,	QC9							
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033)								
ASS18_0.25,	ASS14_0.0,	**25-Jan-2022**	**08-Feb-2022**	25-Jan-2023	✓	**10-Feb-2022**	09-May-2022	✓
ASS12_0.0,	ASS12_1.5,							
ASS12_2.5,	ASS11_0.25,							
ASS10_1.75,	ASS10_2.25,							
ASS10_2.75,	ASS9_0.5,							
ASS9_1.0,	ASS9_2.5,							
ASS18_0.25 - unground portion,	ASS14_0.0 - unground portion,							
ASS12_0.0 - unground portion,	ASS12_1.5 - unground portion,							
ASS12_2.5 - unground portion,	ASS11_0.25 - unground portion,							
ASS10_1.75 - unground portion,	ASS10_2.25 - unground portion,							
ASS10_2.75 - unground portion,	ASS9_0.5 - unground portion,							
ASS9_1.0 - unground portion,	ASS9_2.5 - unground portion							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-B: Potential Acidity								
Snap Lock Bag - frozen (EA033)								
ASS18_0.25,	ASS14_0.0,	**25-Jan-2022**	**08-Feb-2022**	25-Jan-2023	✓	**10-Feb-2022**	09-May-2022	✓
ASS12_0.0,	ASS12_1.5,							
ASS12_2.5,	ASS11_0.25,							
ASS10_1.75,	ASS10_2.25,							
ASS10_2.75,	ASS9_0.5,							
ASS9_1.0,	ASS9_2.5,							
ASS18_0.25 - unground portion,	ASS14_0.0 - unground portion,							
ASS12_0.0 - unground portion,	ASS12_1.5 - unground portion,							
ASS12_2.5 - unground portion,	ASS11_0.25 - unground portion,							
ASS10_1.75 - unground portion,	ASS10_2.25 - unground portion,							
ASS10_2.75 - unground portion,	ASS9_0.5 - unground portion,							
ASS9_1.0 - unground portion,	ASS9_2.5 - unground portion							
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA033)								
ASS18_0.25,	ASS14_0.0,	**25-Jan-2022**	**08-Feb-2022**	25-Jan-2023	✓	**10-Feb-2022**	09-May-2022	✓
ASS12_0.0,	ASS12_1.5,							
ASS12_2.5,	ASS11_0.25,							
ASS10_1.75,	ASS10_2.25,							
ASS10_2.75,	ASS9_0.5,							
ASS9_1.0,	ASS9_2.5,							
ASS18_0.25 - unground portion,	ASS14_0.0 - unground portion,							
ASS12_0.0 - unground portion,	ASS12_1.5 - unground portion,							
ASS12_2.5 - unground portion,	ASS11_0.25 - unground portion,							
ASS10_1.75 - unground portion,	ASS10_2.25 - unground portion,							
ASS10_2.75 - unground portion,	ASS9_0.5 - unground portion,							
ASS9_1.0 - unground portion,	ASS9_2.5 - unground portion							
EA033-D: Retained Acidity								
Snap Lock Bag - frozen (EA033)								
ASS18_0.25,	ASS14_0.0,	**25-Jan-2022**	**08-Feb-2022**	25-Jan-2023	✓	**10-Feb-2022**	09-May-2022	✓
ASS12_0.0,	ASS12_1.5,							
ASS12_2.5,	ASS11_0.25,							
ASS10_1.75,	ASS10_2.25,							
ASS10_2.75,	ASS9_0.5,							
ASS9_1.0,	ASS9_2.5,							
ASS18_0.25 - unground portion,	ASS14_0.0 - unground portion,							
ASS12_0.0 - unground portion,	ASS12_1.5 - unground portion,							
ASS12_2.5 - unground portion,	ASS11_0.25 - unground portion,							
ASS10_1.75 - unground portion,	ASS10_2.25 - unground portion,							
ASS10_2.75 - unground portion,	ASS9_0.5 - unground portion,							
ASS9_1.0 - unground portion,	ASS9_2.5 - unground portion							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen (EA033)								
ASS18_0.25,	ASS14_0.0,	**25-Jan-2022**	**08-Feb-2022**	25-Jan-2023	✓	**10-Feb-2022**	09-May-2022	✓
ASS12_0.0,	ASS12_1.5,							
ASS12_2.5,	ASS11_0.25,							
ASS10_1.75,	ASS10_2.25,							
ASS10_2.75,	ASS9_0.5,							
ASS9_1.0,	ASS9_2.5,							
ASS18_0.25 - unground portion,	ASS14_0.0 - unground portion,							
ASS12_0.0 - unground portion,	ASS12_1.5 - unground portion,							
ASS12_2.5 - unground portion,	ASS11_0.25 - unground portion,							
ASS10_1.75 - unground portion,	ASS10_2.25 - unground portion,							
ASS10_2.75 - unground portion,	ASS9_0.5 - unground portion,							
ASS9_1.0 - unground portion,	ASS9_2.5 - unground portion							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	3	24	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	In house: Referenced to Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Sara Perkov

From:	Weekes, Bernie <BERNIE.WEEKES@coffey.com>
Sent:	Thursday, 3 February 2022 4:34 PM
To:	Samples Perth
Cc:	ALS Enviro Perth
Subject:	[EXTERNAL] - RE: RESULTS & EDD for ALS Workorder : EP2201003 | Your Reference: 754-PEREN295751 Perdaman
Follow Up Flag:	Follow up
Flag Status:	Flagged
Categories:	Rebatch

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi,
I would like to request further ASS analysis on the following samples:

ASS18_0.25: Split sample and test EA033-WA on both ground and unground portions to determine variation in ANC
ASS18_0.75: EA029

ASS14_0.0: Split sample and test EA033-WA on both ground and unground portions to determine variation in ANC
ASS14_0.5: EA029

ASS12_0.0: Split sample and test EA033-WA on both ground and unground portions to determine variation in ANC
ASS12_0.5: EA029
ASS12_1.5: Split sample and test EA033-WA on both ground and unground portions to determine variation in ANC
ASS12_2.5: Split sample and test EA033-WA on both ground and unground portions to determine variation in ANC

ASS11_0.25: Split sample and test EA033-WA on both ground and unground portions to determine variation in ANC
ASS11_1.0: EA029

ASS10_0.25: EA029
ASS10_1.75: Split sample and test EA033-WA on both ground and unground portions to determine variation in ANC
ASS10_2.25: Split sample and test EA033-WA on both ground and unground portions to determine variation in ANC
ASS10_2.75: Split sample and test EA033-WA on both ground and unground portions to determine variation in ANC

ASS9_0.0: EA029
ASS9_0.5: Split sample and test EA033-WA on both ground and unground portions to determine variation in ANC
ASS9_1.0: Split sample and test EA033-WA on both ground and unground portions to determine variation in ANC
ASS9_2.5: Split sample and test EA033-WA on both ground and unground portions to determine variation in ANC

QC5: Hold

QC7: EA029

QC9: EA029

Thanks

Environmental Division
Perth
Work Order Reference
EP2201247

Telephone : -- 61-8-9406 1301

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201330**	Page	: 1 of 9
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman PSI	Date Samples Received	: 01-Feb-2022 11:50
Order number	: ----	Date Analysis Commenced	: 08-Feb-2022
C-O-C number	: ----	Issue Date	: 14-Feb-2022 18:23
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 20		
No. of samples analysed	: 20		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EA033-WA is not NATA accredited off an unpulverised portion.
- This work order is Rebatch of EP2201074.
- EK067G: Total Phosphorus LOR raised for sample #1 due to possible sample matrix interference.
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime ($CaCO_3$) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime ($CaCO_3$) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil, multiply reported results x wet bulk density of soil in t/m3.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS21_0.0	ASS1_0.0	ASS1_0.5	ASS1_1.5	ASS1_2.5
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201330-001	EP2201330-002	EP2201330-003	EP2201330-004	EP2201330-005
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	9.4	9.3	----	----	----
pH OX (23B)	----	0.1	pH Unit	8.3	8.4	----	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	----	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	----	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	<0.005	<0.005	----	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	<0.005	<0.005	----	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	<0.005	<0.005	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	0.129	0.024	----	----	----
Peroxide Sulfur (23De)	----	0.005	% S	0.189	0.049	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	0.060	0.024	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	37	15	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	0.282	0.223	----	----	----
Peroxide Calcium (23Wh)	----	0.005	% Ca	14.3	9.59	----	----	----
Acid Reacted Calcium (23X)	----	0.005	% Ca	14.0	9.37	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	7000	4680	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	11.2	7.50	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	0.079	0.069	----	----	----
Peroxide Magnesium (23Tm)	----	0.005	% Mg	0.975	0.721	----	----	----
Acid Reacted Magnesium (23U)	----	0.005	% Mg	0.897	0.652	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	738	536	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	1.18	0.860	----	----	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	37.6	26.5	----	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	7500	5290	----	----	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	12.0	8.48	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS21_0.0	ASS1_0.0	ASS1_0.5	ASS1_1.5	ASS1_2.5
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201330-001	EP2201330-002	EP2201330-003	EP2201330-004	EP2201330-005
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**----**	**----**	**----**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	**----**	**----**	**----**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	**----**	**----**	**----**
Liming Rate	----	1	kg CaCO3/t	<1	<1	**----**	**----**	**----**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.06**	**0.02**	**----**	**----**	**----**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**37**	**15**	**----**	**----**	**----**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**3**	**1**	**----**	**----**	**----**
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**----**	**----**	**9.6**	**9.4**	**9.4**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**----**	**----**	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**----**	**----**	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**----**	**----**	**0.006**	<0.005	**0.006**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**----**	**----**	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**----**	**----**	**53.2**	**53.2**	**57.3**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**----**	**----**	**10600**	**10600**	**11400**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**----**	**----**	**17.0**	**17.0**	**18.3**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**----**	**----**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**----**	**----**	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	**----**	**----**	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	**----**	**----**	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**----**	**----**	<0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**----**	**----**	<10	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	**----**	**----**	<1	<1	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS2_0.25	ASS3_0.25	ASS3_0.75	ASS4_0.5	ASS4_1.0
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201330-006	EP2201330-007	EP2201330-008	EP2201330-009	EP2201330-010
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	9.3	8.7	----	8.7	----
pH OX (23B)	----	0.1	pH Unit	8.4	8.4	----	9.2	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	----	<2	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	----	<2	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	<0.005	<0.005	----	<0.005	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	<0.005	<0.005	----	<0.005	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	<0.005	<0.005	----	<0.005	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	0.007	<0.005	----	<0.005	----
Peroxide Sulfur (23De)	----	0.005	% S	0.016	<0.005	----	<0.005	----
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	0.010	<0.005	----	<0.005	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	6	<5	----	<5	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	0.221	0.252	----	0.223	----
Peroxide Calcium (23Wh)	----	0.005	% Ca	10.5	1.06	----	0.456	----
Acid Reacted Calcium (23X)	----	0.005	% Ca	10.3	0.804	----	0.233	----
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	5150	401	----	116	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	8.26	0.643	----	0.187	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	0.055	0.033	----	0.023	----
Peroxide Magnesium (23Tm)	----	0.005	% Mg	0.702	0.100	----	0.057	----
Acid Reacted Magnesium (23U)	----	0.005	% Mg	0.648	0.067	----	0.034	----
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	533	55	----	28	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	0.854	0.088	----	0.045	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	30.3	3.00	----	1.27	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	6060	600	----	253	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	9.70	0.961	----	0.405	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS2_0.25	ASS3_0.25	ASS3_0.75	ASS4_0.5	ASS4_1.0
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201330-006	EP2201330-007	EP2201330-008	EP2201330-009	EP2201330-010
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**----**	**1.5**	**----**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	**----**	<0.02	**----**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	**----**	<10	**----**
Liming Rate	----	1	kg CaCO3/t	<1	<1	**----**	<1	**----**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	**----**	<0.02	**----**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	**----**	<10	**----**
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	**----**	<1	**----**
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**----**	**----**	**9.0**	**----**	**8.8**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**----**	**----**	<2	**----**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**----**	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**----**	**----**	<0.005	**----**	**0.007**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**----**	**----**	<10	**----**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**----**	**----**	**16.5**	**----**	**2.96**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**----**	**----**	**3300**	**----**	**592**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**----**	**----**	**5.29**	**----**	**0.95**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**----**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**----**	**----**	<0.02	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	**----**	**----**	<10	**----**	<10
Liming Rate	----	1	kg CaCO3/t	**----**	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**----**	**----**	<0.02	**----**	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**----**	**----**	<10	**----**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	**----**	**----**	<1	**----**	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS5_0.5	ASS5_0.9	QC28	ASS1_0.5 Unground	ASS1_1.5 Unground
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201330-011	EP2201330-012	EP2201330-013	EP2201330-014	EP2201330-015
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	8.4	----	----	----
pH OX (23B)	----	0.1	pH Unit	----	8.9	----	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	<2	----	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	----	<0.005	----	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	----	<0.005	----	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	----	<0.005	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	----	<0.005	----	----	----
Peroxide Sulfur (23De)	----	0.005	% S	----	<0.005	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	----	<0.005	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	----	<5	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	----	0.266	----	----	----
Peroxide Calcium (23Wh)	----	0.005	% Ca	----	0.451	----	----	----
Acid Reacted Calcium (23X)	----	0.005	% Ca	----	0.184	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	----	92	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	----	0.148	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	----	0.031	----	----	----
Peroxide Magnesium (23Tm)	----	0.005	% Mg	----	0.100	----	----	----
Acid Reacted Magnesium (23U)	----	0.005	% Mg	----	0.069	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	----	57	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	----	0.091	----	----	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	----	1.67	----	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	334	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS5_0.5	ASS5_0.9	QC28	ASS1_0.5 Unground	ASS1_1.5 Unground
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201330-011	EP2201330-012	EP2201330-013	EP2201330-014	EP2201330-015
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	----	0.536	----	----	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	7.9	----	8.3	9.7	9.5
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	0.006	<0.005	0.006
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.60	----	0.92	46.8	36.9
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	120	----	183	9340	7370
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.19	----	0.29	15.0	11.8
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	<1	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS1_2.5 Unground	ASS3_0.75 Unground	ASS4_1.0 Unground	ASS5_0.5 Unground	QC28 Unground
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201330-016	EP2201330-017	EP2201330-018	EP2201330-019	EP2201330-020
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	9.5	9.3	9.1	7.4	8.9
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.006	0.007	0.005	0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	47.6	17.9	2.57	0.34	0.48
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	9500	3580	514	67	96
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	15.2	5.75	0.82	0.11	0.15
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2201330**	Page	: 1 of 7
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman PSI	Date Samples Received	: 01-Feb-2022
Order number	: ----	Date Analysis Commenced	: 08-Feb-2022
C-O-C number	: ----	Issue Date	: 14-Feb-2022
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 20		
No. of samples analysed	: 20		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA029-A: pH Measurements (QC Lot: 4169137)									
EP2201330-001	ASS21_0.0	EA029: pH KCl (23A)	----	0.1	pH Unit	9.4	9.4	0.0	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	8.3	8.4	0.0	0% - 20%
EP2201334-005	Anonymous	EA029: pH KCl (23A)	----	0.1	pH Unit	9.4	9.4	0.0	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	8.3	8.3	0.0	0% - 20%
EA029-B: Acidity Trail (QC Lot: 4169137)									
EP2201330-001	ASS21_0.0	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EP2201334-005	Anonymous	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EA029-C: Sulfur Trail (QC Lot: 4169137)									
EP2201330-001	ASS21_0.0	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.129	0.120	6.9	0% - 20%
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.189	0.184	2.7	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA029-C: Sulfur Trail (QC Lot: 4169137) - continued									
EP2201330-001	ASS21_0.0	EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.060	0.063	5.7	0% - 50%
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	37	40	5.7	No Limit
EP2201334-005	Anonymous	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.083	0.083	0.0	0% - 50%
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.161	0.152	5.3	0% - 20%
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.078	0.070	11.5	0% - 50%
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	49	43	11.5	No Limit
EA029-D: Calcium Values (QC Lot: 4169137)									
EP2201330-001	ASS21_0.0	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.282	0.261	7.4	0% - 20%
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	14.3	14.1	1.2	0% - 20%
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	14.0	13.9	1.1	0% - 20%
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	11.2	11.1	1.1	0% - 20%
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	7000	6920	1.1	0% - 20%
EP2201334-005	Anonymous	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.247	0.239	3.3	0% - 20%
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	14.9	14.1	5.8	0% - 20%
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	14.7	13.8	5.9	0% - 20%
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	11.8	11.1	5.9	0% - 20%
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	7330	6910	5.9	0% - 20%
EA029-E: Magnesium Values (QC Lot: 4169137)									
EP2201330-001	ASS21_0.0	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.079	0.075	4.9	0% - 50%
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.975	0.994	1.8	0% - 20%
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	0.897	0.919	2.4	0% - 20%
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	1.18	1.21	2.4	0% - 20%
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	738	756	2.4	0% - 20%
EP2201334-005	Anonymous	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.099	0.098	0.0	0% - 50%
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	1.53	1.64	7.2	0% - 20%
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	1.43	1.54	7.8	0% - 20%
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	1.88	2.04	7.8	0% - 20%
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	1170	1270	7.8	0% - 20%
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 4169137)									
EP2201330-001	ASS21_0.0	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	37.6	37.6	0.2	0% - 20%
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	12.0	12.0	0.2	0% - 20%
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	7500	7520	0.2	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 4169137) - continued									
EP2201334-005	Anonymous	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	40.6	40.5	0.3	0% - 20%
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	13.0	13.0	0.3	0% - 20%
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	8120	8100	0.3	0% - 20%
EA029-H: Acid Base Accounting (QC Lot: 4169137)									
EP2201330-001	ASS21_0.0	EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.06	0.06	0.0	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	3	3	0.0	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	37	40	7.8	No Limit
EP2201334-005	Anonymous	EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.08	0.07	13.3	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	4	3	28.6	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	49	43	13.0	No Limit
EA033-A: Actual Acidity (QC Lot: 4169135)									
EP2201330-003	ASS1_0.5	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.6	9.6	0.0	0% - 20%
EP2201330-017	ASS3_0.75 Unground	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.3	9.3	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 4169135)									
EP2201330-003	ASS1_0.5	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	<0.005	18.2	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2201330-017	ASS3_0.75 Unground	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	<0.005	18.2	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 4169135)									
EP2201330-003	ASS1_0.5	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	53.2	53.3	0.2	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	17.0	17.1	0.2	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	10600	10600	0.2	0% - 20%
EP2201330-017	ASS3_0.75 Unground	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	17.9	18.0	0.6	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA033-C: Acid Neutralising Capacity (QC Lot: 4169135) - continued									
EP2201330-017	ASS3_0.75 Unground	EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	5.75	5.78	0.5	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	3580	3610	0.6	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 4169135)									
EP2201330-003	ASS1_0.5	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2201330-017	ASS3_0.75 Unground	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA029-A: pH Measurements (QCLot: 4169137)								
EA029: pH KCl (23A)	----	----	pH Unit	----	5.047 pH Unit	96.5	94.3	105
EA029: pH OX (23B)	----	----	pH Unit	----	3.5615 pH Unit	105	91.7	120
EA029-B: Acidity Trail (QCLot: 4169137)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	93.2	80.4	108
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	55.0798 mole H+ / t	102	91.1	117
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 4169137)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	0.05325 % S	96.9	75.8	130
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	0.158 % S	84.6	81.7	122
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 4169137)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.020	0.22305 % Ca	91.9	84.5	128
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.020	0.2064 % Ca	92.0	82.6	119
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values (QCLot: 4169137)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	0.12082 % Mg	84.3	77.5	120
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.020	0.18219 % Mg	91.9	80.6	111
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	----	----	----	----
EA033-A: Actual Acidity (QCLot: 4169135)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	104	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 4169135)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	99.0	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 4169135)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EA033-C: Acid Neutralising Capacity (QCLot: 4169135) - continued								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 4169135)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201330**	Page	: 1 of 6
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman PSI	Date Samples Received	: 01-Feb-2022
Site	: ----	Issue Date	: 14-Feb-2022
Sampler	: SANJANA AUDIT	No. of samples received	: 20
Order number	: ----	No. of samples analysed	: 20

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*		*Sample Date*	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA029-A: pH Measurements								
80* dried soil (EA029)								
ASS21_0.0,	ASS1_0.0,	**28-Jan-2022**	**08-Feb-2022**	23-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
ASS2_0.25,	ASS3_0.25,							
ASS4_0.5,	ASS5_0.9							
EA029-B: Acidity Trail								
80* dried soil (EA029)								
ASS21_0.0,	ASS1_0.0,	**28-Jan-2022**	**08-Feb-2022**	23-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
ASS2_0.25,	ASS3_0.25,							
ASS4_0.5,	ASS5_0.9							
EA029-C: Sulfur Trail								
80* dried soil (EA029)								
ASS21_0.0,	ASS1_0.0,	**28-Jan-2022**	**08-Feb-2022**	23-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
ASS2_0.25,	ASS3_0.25,							
ASS4_0.5,	ASS5_0.9							
EA029-D: Calcium Values								
80* dried soil (EA029)								
ASS21_0.0,	ASS1_0.0,	**28-Jan-2022**	**08-Feb-2022**	23-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
ASS2_0.25,	ASS3_0.25,							
ASS4_0.5,	ASS5_0.9							
EA029-E: Magnesium Values								
80* dried soil (EA029)								
ASS21_0.0,	ASS1_0.0,	**28-Jan-2022**	**08-Feb-2022**	23-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
ASS2_0.25,	ASS3_0.25,							
ASS4_0.5,	ASS5_0.9							
EA029-F: Excess Acid Neutralising Capacity								
80* dried soil (EA029)								
ASS21_0.0,	ASS1_0.0,	**28-Jan-2022**	**08-Feb-2022**	23-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
ASS2_0.25,	ASS3_0.25,							
ASS4_0.5,	ASS5_0.9							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-G: Retained Acidity							
80* dried soil (EA029) ASS21_0.0, ASS1_0.0, ASS2_0.25, ASS3_0.25, ASS4_0.5, ASS5_0.9	**28-Jan-2022**	**08-Feb-2022**	23-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA029-H: Acid Base Accounting							
80* dried soil (EA029) ASS21_0.0, ASS1_0.0, ASS2_0.25, ASS3_0.25, ASS4_0.5, ASS5_0.9	**28-Jan-2022**	**08-Feb-2022**	23-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA033-A: Actual Acidity							
80* dried soil (EA033) ASS1_0.5, ASS1_1.5, ASS1_2.5, ASS3_0.75, ASS4_1.0, ASS5_0.5, QC28, ASS1_0.5 - Unground, ASS1_1.5 - Unground, ASS1_2.5 - Unground, ASS3_0.75 - Unground, ASS4_1.0 - Unground, ASS5_0.5 - Unground, QC28 - Unground	**28-Jan-2022**	**08-Feb-2022**	28-Jan-2023	✓	**11-Feb-2022**	09-May-2022	✓
EA033-B: Potential Acidity							
80* dried soil (EA033) ASS1_0.5, ASS1_1.5, ASS1_2.5, ASS3_0.75, ASS4_1.0, ASS5_0.5, QC28, ASS1_0.5 - Unground, ASS1_1.5 - Unground, ASS1_2.5 - Unground, ASS3_0.75 - Unground, ASS4_1.0 - Unground, ASS5_0.5 - Unground, QC28 - Unground	**28-Jan-2022**	**08-Feb-2022**	28-Jan-2023	✓	**11-Feb-2022**	09-May-2022	✓
EA033-C: Acid Neutralising Capacity							
80* dried soil (EA033) ASS1_0.5, ASS1_1.5, ASS1_2.5, ASS3_0.75, ASS4_1.0, ASS5_0.5, QC28, ASS1_0.5 - Unground, ASS1_1.5 - Unground, ASS1_2.5 - Unground, ASS3_0.75 - Unground, ASS4_1.0 - Unground, ASS5_0.5 - Unground, QC28 - Unground	**28-Jan-2022**	**08-Feb-2022**	28-Jan-2023	✓	**11-Feb-2022**	09-May-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-D: Retained Acidity								
80* dried soil (EA033)								
ASS1_0.5,	ASS1_1.5,	**28-Jan-2022**	**08-Feb-2022**	28-Jan-2023	✓	**11-Feb-2022**	09-May-2022	✓
ASS1_2.5,	ASS3_0.75,							
ASS4_1.0,	ASS5_0.5,							
QC28,	ASS1_0.5 - Unground,							
ASS1_1.5 - Unground,	ASS1_2.5 - Unground,							
ASS3_0.75 - Unground,	ASS4_1.0 - Unground,							
ASS5_0.5 - Unground,	QC28 - Unground							
EA033-E: Acid Base Accounting								
80* dried soil (EA033)								
ASS1_0.5,	ASS1_1.5,	**28-Jan-2022**	**08-Feb-2022**	28-Jan-2023	✓	**11-Feb-2022**	09-May-2022	✓
ASS1_2.5,	ASS3_0.75,							
ASS4_1.0,	ASS5_0.5,							
QC28,	ASS1_0.5 - Unground,							
ASS1_1.5 - Unground,	ASS1_2.5 - Unground,							
ASS3_0.75 - Unground,	ASS4_1.0 - Unground,							
ASS5_0.5 - Unground,	QC28 - Unground							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	In house: Referenced to Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Lewis Duffy

From: Weekes, Bernie <BERNIE.WEEKES@coffey.com>
Sent: Friday, 4 February 2022 3:47 PM
To: Samples Perth
Cc: ALS Enviro Perth
Subject: [EXTERNAL] - RE: RESULTS & EDD for ALS Workorder : EP2201074 | Your Reference: 754-PEREN295751 Perdaman PSI

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi,
See below instruction for further testing on ASS samples.
Firm 5 day tat required.

1 ASS21_0.0: EA029 + Reacted Calcium (CAA)

2 ASS1_0.0: SPOCAS + Reacted Calcium (CAA)
3/14 ASS1_0.5: EA033-WA on both ground and unground portions to determine variation in ANC
4/15 ASS1_1.5: EA033-WA on both ground and unground portions to determine variation in ANC
5/16 ASS1_2.5: EA033-WA on both ground and unground portions to determine variation in ANC

6 ASS2_0.25: SPOCAS + Reacted Calcium (CAA)

7 ASS3_0.25: SPOCAS + Reacted Calcium (CAA)
8/17 ASS3_0.75: EA033-WA on both ground and unground portions to determine variation in ANC

9 ASS4_0.5: SPOCAS + Reacted Calcium (CAA)
10/18 ASS4_1.0: EA033-WA on both ground and unground portions to determine variation in ANC

11/19 ASS5_0.5: EA033-WA on both ground and unground portions to determine variation in ANC
12 ASS5_0.9: SPOCAS + Reacted Calcium (CAA)

13/20 QC28: EA033-WA on both ground and unground portions to determine variation in ANC

Environmental Division
Perth
Work Order Reference
EP2201330

Telephone : -- 61-8-9406 1301

Regards,

Bernie Weekes, GradCertProjMgt, BSc (EnvMgt)/BBus | Principal Environmental Consultant
Mobile **+61 407 817 762** Business **+61 8 6218 2161** | bernie.weekes@tetratech.com

From: angel-no-reply@alsglobal.com <angel-no-reply@alsglobal.com>
Sent: Friday, February 4, 2022 11:43 AM
To: Weekes, Bernie <BERNIE.WEEKES@coffey.com>
Subject: RESULTS & EDD for ALS Workorder : EP2201074 | Your Reference: 754-PEREN295751 Perdaman PSI

⚠ **CAUTION:** This email originated from an external sender. Verify the source before opening links or attachments. ⚠

Deliverables for ALS Workorder EP2201074

Project: 754-PEREN295751 Perdaman PSI

Dear Bernie Weekes,

Please find enclosed the following deliverables for **EP2201074**:

- 754-PEREN295751 Perdaman PSI.ESDAT_EP2201074_0.Chemistry2e.CSV
- 754-PEREN295751 Perdaman PSI.ESDAT_EP2201074_0.Header.XML
- 754-PEREN295751 Perdaman PSI.ESDAT_EP2201074_0.Sample2e.CSV
- EP2201074_0_COA (Preliminary Report - 2022-Feb-4--11-32-22) .pdf
- EP2201074_0_XTAB.XLS
- EP2201074_0_QC.pdf
- EP2201074_0_QCI.pdf
- EP2201074_COC.pdf

Report Recipients

- Bernie Weekes
  - 754-PEREN295751 Perdaman PSI.ESDAT_EP2201074_0.Chemistry2e.CSV
  - 754-PEREN295751 Perdaman PSI.ESDAT_EP2201074_0.Header.XML
  - 754-PEREN295751 Perdaman PSI.ESDAT_EP2201074_0.Sample2e.CSV
  - EP2201074_0_COA (Preliminary Report - 2022-Feb-4--11-32-22) .pdf (Email)
  - EP2201074_0_XTAB.XLS
  - EP2201074_0_QC.pdf (Email)
  - EP2201074_0_QCI.pdf (Email)
  - EP2201074_COC.pdf (Email)

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office: Perth – Tetra Tech Coffey
Report Results to: Bernie Weekes
Invoices to:
Mobile: 0407817762.
Phone:
Email: bernie.weekes@coffey.@tetratech.com
Email: - @tetratech.com

Project No: 754-PERENV295751
Task No:
Project Name: Perdaman PSI
Laboratory: ALS (ARL-Eurofins for trip.
Sampler's Name: S.Audit
Project Manager: Bernie Weekes
Quote number (if different to current quoted prices):
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)
1	SS19-0	28/1/22	AM	Soil	1P, 2J, 1Z	5-day
2	SS19-0.5				"	
3	SS19-1				1P, 2J	
4	SS19-1.5				"	
5	SS19-2				"	
(1) 6	ASS21-0				1Z	
7	ASS21-0.25				"	
8	SS11-0				1P, 2J, 1Z	
9	SS11-0.5				"	
10	SS11-1.0				1P, 2J	
11	SS11-2.0				"	
(2) 12	ASS1-0				1Z	
13	ASS1-0.25				"	
(3/14) 14	ASS1-0.5				"	
15	ASS1-0.75				"	
16	ASS1-1.0				"	

NOTES

To be advised:
- which samples to analyse
- which analysis.

Please contact Bernie Weekes

Only 2 of the 3 eskes on Con-note 8109606666 contain the samples on these 4 pages of COC. Nick Taylor will provide the other COC.

RELINQUISHED BY		RECEIVED BY	
Name: Sanjana Audit	Date: 28/1/22 →	Name: L Duffy	Date: 1/2/22
Coffey	Time:	Company: ALS	Time: 1150
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Sample Receipt Advice: (Lab Use Only)
All Samples Recieved in Good Condition ☐
All Docume
Samples Re
Lab. Ref/Ba

Environmental Division
Perth
Work Order Reference
EP2201074

Chain of custody
Issued: 30 July 2020
UNCONTROLLED WHEN PRINTED

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: Mobile: Email: @tetratech.com
Invoices to: Phone: Email: @tetratech.com

Project No: 754-PERCN29 5751 Task No:
Project Name: Perdaman PST Laboratory:
Sampler's Name: Project Manager:
Quote number (if different to current quoted prices):
Special Instructions:

Analysis Request Section

	Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	NOTES
	17	ASS1_1.25	28/1/22	AM	Soil	1Z	5-day	
4/15	18	ASS1_1.50	"	"	"	"		
	19	ASS1_1.75	"	"	"	"		
	20	ASS1_2.00	"	"	"	"		
	21	ASS1_2.25	"	"	"	"		
5/16	22	ASS1_2.50	"	"	"	"		
	23	ASS1_2.75	"	"	"	"		
	24	ASS1_3.00	"	"	"	"		
	25	ASS2_0	"	"	"	"		
6	26	ASS2_0.25	"	"	"	"		
	27	ASS3_0	"	"	"	"		
7	28	ASS3_0.25	"	"	"	"		
	29	ASS3_0.50	"	"	"	"		
17/18	30	ASS3_0.75	"	"	"	"		
	31	ASS3_0.90	"	"	"	"		
	32	SS9_0	"	"	"	1Z, 2J, 1P(AS)		

RELINQUISHED BY		RECEIVED BY	
Name: Sanjana Audit	Date: 28/1/22 →	Name:	Date:
Coffey	Time:	Company:	Time:
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Sample Receipt Advice: (Lab Use Only)
All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

Chain of custody
Issued: 30 July 2020
UNCONTROLLED WHEN PRINTED

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: Mobile: Email: @tetratech.com
Invoices to: Phone: Email: @tetratech.com

Project No: Task No:
Project Name: TSY_PERENJ295751 Laboratory:
Sampler's Name: Perdaman PST Project Manager:
Quote number (if different to current quoted prices):
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	NOTES
33	SS9 - 0.5	28/11/22	AM	S	1Z, 2J, 1P	5days	
34	SS9 - 1.0	↓	↓	↓	2J, 1P	↓	
35	SS9 - 1.3				"		
36	ASS4 - 0				1Z		
37	ASS4 - 0.25				"		
(9) 38	ASS4 - 0.50				"		
39	ASS4 - 0.75				"		
(10/10) 40	ASS4 - 1.0				"		
41	ASS4 - 1.25				"		
42	ASS5 - 0				"		
43	ASS5 - 0.25				"		
(11/19) 44	ASS5 - 0.50				"		
45	ASS5 - 0.75				"		
(12) 46	ASS5 - 0.90				"		
47	QC01				1Z, 2J, 1P		~~Full analysis + asbestos~~
	QC22	↓	↓	↓	"	↓	~~Full + asbestos~~

RELINQUISHED BY		RECEIVED BY	
Name: Sanjana Andit	Date: 28/11/22	Name:	Date:
Coffey	Time:	Company:	Time:
Name:	Date:	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)
All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:

Report Results to: Mobile: Email: @tetratech.com

Invoices to: Phone: Email: @tetratech.com

Project No: 754-PGEN295751 Task No:

Project Name: Perdaman PST Laboratory:

Sampler's Name: Project Manager:

Quote number (if different to current quoted prices):

Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	NOTES
48	QC23	28/1	AM	S	~~ST~~ 1P, 2J	5days	
	QC24	↓	↓	↓	1P, 2J		
49	QC25				"		
	QC26	↓	↓	↓	"		
50	QC27				1Z		
51	QC28				↓		
52	QC29	↓	↓	↓	↓		
53	QC30			W	various (2x40 ml vials + 1x100ml bottle)		
54	QC31	↓	↓	"	various (2x40ml vials, 2x100ml bottles/amber), 2 PFAS bottles, 1 inorgs bottle, 1 metals bottle)		

3/2

RELINQUISHED BY		RECEIVED BY		Sample Receipt Advice: (Lab Use Only)
Name: Sanjana Audit	Date: 28/1/22 →	Name:	Date:	All Samples Recieved in Good Condition ☐
Coffey	Time:	Company:	Time:	All Documentation is in Proper Order ☐
Name:	Date: →	Name:	Date:	Samples Received Properly Chilled ☐
Company:	Time:	Company:	Time:	Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES
Invoices to: COFFEY ACCOUNTS
Mobile: 0407 817 762
Phone:
Email: bernie.weekes@coffey.com
Email: @tetratech.com

Project No: 754 _ PERENZ95751
Task No: LAB
Project Name: PERDAWAN
Laboratory: ALS
Sampler's Name: NICK TAYLOR / CONNOR RICHARDS
Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S2	EP231X	EP262	W16T	W04	HOLD
1	SS24 - 0m	25/1/22		SOIL	2J, 1P	5DAY							
2	SS24 - 0.5m							X	X	X			
3	SS24 - 1.0m												
4	SS24 - 2.0m											X	
5	AS510 - 0m				1Z		X						
6	AS510 - 0.25m						X						
7	AS510 - 0.5m						X						
8	AS510 - 0.75m						X						
9	AS510 - 1.0m						X						
10	AS510 - 1.25m						X						
11	AS510 - 1.5m						X						
12	AS510 - 1.75m						X						
13	AS510 - 2.0m						X						
14	AS510 - 2.25m						X						
15	AS510 - 2.5m						X						
16	AS510 - 2.75m						X						

NOTES: EMAIL EA037 RESULTS TO BERNIE(pm) ASAP.

Environmental Division Perth
Work Order Reference
EP2201003

RELINQUISHED BY	RECEIVED BY
Name: NICK TAYLOR Company: Coffey Date: 26/1/22 Time: 15:45	Name: DUFFY Company: ALS Date: 26/1/22 Time: 1145
Name: Company: Date: Time:	Name: Company: Date: Time:

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Chain of custody
Issued: 30 July 2020
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CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES
Invoices to: COFFEY ACCOUNTS
Mobile: 0407 817 762
Phone:
Email: bernie.weekes@coffey.com
Email: @tetratech.com

Project No: 754 _ PERENZ95751
Task No: LAB
Project Name: PERDAWAN
Laboratory: ALS
Sampler's Name: CONNOR RICHARDS / NICK TAYLOR
Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S2	EP231X	EP262	W16T	W04	HOLD
17	AS510 - 3.0m	25/1/22		SOIL	1Z	5DAY	X						
18	AS59 - 0m						X						
19	AS59 - 0.25m						X						
20	AS59 - 0.5m						X						
21	AS59 - 0.75m						X						
22	AS59 - 1.0m						X						
23	AS59 - 1.25m						X						
24	AS59 - 1.5m						X						
25	AS59 - 1.75m						X						
26	AS59 - 2m						X						
27	AS59 - 2.25m						X						
28	AS59 - 2.5m						X						
29	AS59 - 2.75m						X						
30	AS59 - 3m						X						
31	SS22 - 0m				2J, 1P			X	X	X			
32	SS22 - 0.5m				2J, 1P							X	

NOTES: EMAIL EA037 RESULTS TO BERNIE(pm) ASAP.

RELINQUISHED BY	RECEIVED BY
Name: NICK TAYLOR Company: Coffey Date: 26/1/22 Time: 15:45	Name: Company: Date: Time:
Name: Company: Date: Time:	Name: Company: Date: Time:

Sample Receipt Advice: (Lab Use Only)
All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Chain of custody
Issued: 30 July 2020
UNCONTROLLED WHEN PRINTED

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES — Mobile: 0407 817 762 — Email: bernie.weekes@coffey.com
Invoices to: — Phone: — Email: @tetratech.com

Project No: 754_PERGN295751 — Task No: LAB
Project Name: PERDAMAN — Laboratory: ALS
Sampler's Name: CONNOR RICHARDS/NICK TAYLOR — Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section: EA037, S2, EP231X, EP262, W16T, WQL, HOLD

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S2	EP231X	EP262	W16T	WQL	HOLD	NOTES
33	SS22_1.0m	25/1/22		SOIL	2J, 1P	5 DAY		X	X	X			X	EMAIL EA037 RESULTS TO BERNIE (AM) ASAP.
34	SS22_2.0m				2J, 1P									
35	AS11_0m				1Z		X							
36	AS11_0.25m						X							
37	AS11_0.5m						X							
38	AS11_0.75m						X							
39	AS11_1.0m						X							
SNR40	AS11_1.25m						X							
SNR41	AS11_1.5m						X							
SNR42	AS11_1.75m						X							
SNR43	AS11_2m						X							
SNR44	AS11_2.25m						X							
SNR45	AS11_2.5m						X							
SNR46	AS11_2.75m						X							
SNR47	AS11_3m						X							
40 48	AS12_0m						X							

RELINQUISHED BY		RECEIVED BY	
Name: NICK TAYLOR, Coffey	Date: 26/1/22, Time: 15:45	Name:	Date:
		Company:	Time:
Name:	Date:	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)
- All Samples Recieved in Good Condition ☐
- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Chain of custody
Issued: 30 July 2020
UNCONTROLLED WHEN PRINTED

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES — Mobile: 0407 817 762 — Email: bernie.weekes@coffey.com
Invoices to: COFFEY ACCOUNTS. — Phone: — Email: @tetratech.com

Project No: 754_PERGN295751 — Task No: LAB
Project Name: PERDAMAN — Laboratory: ALS
Sampler's Name: CONNOR RICHARDS / NICK TAYLOR — Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section: EA037, S2, EP231X, EP262, W16T, WQL, HOLD, S13, S26

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S2	EP231X	EP262	W16T	WQL	HOLD	S13	S26	NOTES
41 49	AS12_0.25m	25/1/22		SOIL	1Z	5 DAY	X									EMAIL EA037 RESULTS TO BERNIE (AM) ASAP
42 50	AS12_0.5m						X									
43 51	AS12_0.75m						X									
44 52	AS12_1.0m						X									
45 53	AS12_1.25m						X									
46 54	AS12_1.5m						X									
47 55	AS12_1.75m						X									
48 56	AS12_2m						X									
49 57	AS12_2.25m						X									
50 58	AS12_2.5m						X									
51 59	AS12_2.75m						X									
52 60	AS12_3m						X									
53 61	SS25_0m				2J, 1P				X	X				X	X	
54 62	SS25_0.5m															
55 63	SS25_1.0m												X			
56 64	SS25_2.0m															

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Name: NICK TAYLOR, Coffey	Date: 26/1/22, Time: 15:45	Name:	Date:
		Company:	Time:
Name:	Date:	Name:	Date:
Company:	Time:	Company:	Time:

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- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

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Invoices to: COFFEY ACCOUNTS
Mobile: 0407 817 762
Phone:
Email: bernie.weekes@coffey.com
Email: @tetratech.com

Project No: 754_PERGN295751
Task No: LAB
Project Name: PERDAMAN
Laboratory: ALS
Sampler's Name: NICK TAYLOR / CONNOR RICHARDS
Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S2	EP231X	EP262	W16T	W04	HOLD	S13	S26	NOTES
657	AS518_0m	25/1/22		SOIL	1Z	5DAY	X									EMAIL EA037 RESULTS TO BERNIE(DM) ASAP.
58	AS518_0.25m						X									
59	AS518_0.5m						X									
66	AS518_0.75m						X									
61	AS518_1.0m						X									
62	AS518_1.25m						X									
63	AS518_1.5m						X									
64	AS518_1.75m						X									
65	AS518_2m						X									
66	AS518_2.25m						X									
67	AS518_2.5m						X									
68	AS514_0m						X									
69	AS514_0.25m						X									
70	AS514_0.5m						X									
71	AS514_0.75m						X									
72	SS26_0m				2J, 1P		X		X				X			

RELINQUISHED BY
Name: NICK TAYLOR
Coffey
Date: 26/1/22
Time: 15:45
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Company:
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Company:
Date:
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Name:
Company:
Date:
Time:

Sample Receipt Advice: (Lab Use Only)
All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

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CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

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Project No: 754_PERGN295751
Task No: LAB
Project Name: PERDAMAN
Laboratory: ALS
Sampler's Name: NICK TAYLOR / CONNOR RICHARDS
Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S26	EP231X	EP262	W16T	W04	HOLD	S13	S2	W-2	W-04	NOTES
73	SS26_0.5m	25/1/22		SOIL	2J, 1P	5DAY		X	X	X			X					EMAIL EA037 RESULTS TO BERNIE(DM) ASAP.
74	SS26_1m							X	X	X			X					
75	SS21_0m											X						
76	SS21_0.5m							X	X	X			X					
77	SS21_1.0m							X	X	X			X					
78	SS21_2.0m											X						
79	QC3											X						
EUR	QC4								X	X								PLEASE FILTER METALS BOTTLES.
80	QC5								X	X					X			
81	QC6				1Z		X								X			
82	QC7						X					X						PLEASE FORWARD QC4 TO EUROFINS & ASK THEM TO ADOPT SAME LEVELS OF REPORTING.
83	QC8						X					X						
84	QC9						X					X						
85	QC10						X					X						
86	QC11			WATER	2G, 3P, 2V							X						
87	QC12			WATER	1G, 2V				X	X					X			

RELINQUISHED BY
Name: NICK TAYLOR
Coffey
Date: 26/1/22
Time: 15:45.
Name:
Company:
Date:
Time:

RECEIVED BY
Name:
Company:
Date:
Time:
Name:
Company:
Date:
Time:

Sample Receipt Advice: (Lab Use Only)
All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Chain of custody
Issued: 30 July 2020
UNCONTROLLED WHEN PRINTED

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201332**	Page	: 1 of 5
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 01-Feb-2022 11:50
Order number	: ----	Date Analysis Commenced	: 08-Feb-2022
C-O-C number	: ----	Issue Date	: 14-Feb-2022 18:25
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- This work order is a Rebatch of EP2201086.
- EA033-WA is not NATA accredited off an unpulverised portion.
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil, multiply reported results x wet bulk density of soil in t/m3.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS19_0.5	ASS20_0.0	ASS20_1.5	ASS20_2.0	ASS20_1.5 Unground
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201332-001	EP2201332-002	EP2201332-003	EP2201332-004	EP2201332-005
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	8.7	9.4	----	----	----
pH OX (23B)	----	0.1	pH Unit	8.4	8.4	----	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	----	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	----	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	<0.005	<0.005	----	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	<0.005	<0.005	----	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	<0.005	<0.005	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	<0.005	0.116	----	----	----
Peroxide Sulfur (23De)	----	0.005	% S	0.005	0.159	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	0.005	0.043	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	<5	27	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	0.248	0.268	----	----	----
Peroxide Calcium (23Wh)	----	0.005	% Ca	0.962	10.3	----	----	----
Acid Reacted Calcium (23X)	----	0.005	% Ca	0.714	10.0	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	356	5010	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	0.571	8.04	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	0.032	0.118	----	----	----
Peroxide Magnesium (23Tm)	----	0.005	% Mg	0.089	1.24	----	----	----
Acid Reacted Magnesium (23U)	----	0.005	% Mg	0.057	1.12	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	47	922	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	0.076	1.48	----	----	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	2.31	27.9	----	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	461	5570	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS19_0.5	ASS20_0.0	ASS20_1.5	ASS20_2.0	ASS20_1.5 Unground
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201332-001	EP2201332-002	EP2201332-003	EP2201332-004	EP2201332-005
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	**0.739**	**8.92**	----	----	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	<1	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**0.04**	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**27**	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**2**	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	----	**9.6**	**9.3**	**9.7**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	----	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	----	**0.006**	<0.005	**0.005**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	----	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	**41.8**	**25.9**	**35.5**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	**8360**	**5170**	**7090**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	**13.4**	**8.29**	**11.4**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	----	----	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	----	----	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	----	<0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	----	<10	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	----	<1	<1	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS20_2.0 Unground	----	----	----	----
			Sampling date / time	27-Jan-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2201332-006	--------	--------	--------	--------
				Result	----	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.4**	----	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**22.2**	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**4430**	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**7.11**	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EP2201332**	Page	: 1 of 7
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 01-Feb-2022
Order number	: ----	Date Analysis Commenced	: 08-Feb-2022
C-O-C number	: ----	Issue Date	: 14-Feb-2022
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA029-A: pH Measurements (QC Lot: 4169137)									
EP2201330-001	Anonymous	EA029: pH KCl (23A)	----	0.1	pH Unit	9.4	9.4	0.0	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	8.3	8.4	0.0	0% - 20%
EP2201334-005	Anonymous	EA029: pH KCl (23A)	----	0.1	pH Unit	9.4	9.4	0.0	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	8.3	8.3	0.0	0% - 20%
EA029-B: Acidity Trail (QC Lot: 4169137)									
EP2201330-001	Anonymous	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EP2201334-005	Anonymous	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EA029-C: Sulfur Trail (QC Lot: 4169137)									
EP2201330-001	Anonymous	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.129	0.120	6.9	0% - 20%
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.189	0.184	2.7	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA029-C: Sulfur Trail (QC Lot: 4169137) - continued									
EP2201330-001	Anonymous	EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.060	0.063	5.7	0% - 50%
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	37	40	5.7	No Limit
EP2201334-005	Anonymous	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.083	0.083	0.0	0% - 50%
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.161	0.152	5.3	0% - 20%
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.078	0.070	11.5	0% - 50%
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	49	43	11.5	No Limit
EA029-D: Calcium Values (QC Lot: 4169137)									
EP2201330-001	Anonymous	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.282	0.261	7.4	0% - 20%
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	14.3	14.1	1.2	0% - 20%
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	14.0	13.9	1.1	0% - 20%
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	11.2	11.1	1.1	0% - 20%
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	7000	6920	1.1	0% - 20%
EP2201334-005	Anonymous	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.247	0.239	3.3	0% - 20%
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	14.9	14.1	5.8	0% - 20%
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	14.7	13.8	5.9	0% - 20%
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	11.8	11.1	5.9	0% - 20%
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	7330	6910	5.9	0% - 20%
EA029-E: Magnesium Values (QC Lot: 4169137)									
EP2201330-001	Anonymous	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.079	0.075	4.9	0% - 50%
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.975	0.994	1.8	0% - 20%
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	0.897	0.919	2.4	0% - 20%
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	1.18	1.21	2.4	0% - 20%
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	738	756	2.4	0% - 20%
EP2201334-005	Anonymous	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.099	0.098	0.0	0% - 50%
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	1.53	1.64	7.2	0% - 20%
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	1.43	1.54	7.8	0% - 20%
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	1.88	2.04	7.8	0% - 20%
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	1170	1270	7.8	0% - 20%
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 4169137)									
EP2201330-001	Anonymous	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	37.6	37.6	0.2	0% - 20%
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	12.0	12.0	0.2	0% - 20%
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	7500	7520	0.2	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 4169137) - continued									
EP2201334-005	Anonymous	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	40.6	40.5	0.3	0% - 20%
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	13.0	13.0	0.3	0% - 20%
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	8120	8100	0.3	0% - 20%
EA029-H: Acid Base Accounting (QC Lot: 4169137)									
EP2201330-001	Anonymous	EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.06	0.06	0.0	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	3	3	0.0	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	37	40	7.8	No Limit
EP2201334-005	Anonymous	EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.08	0.07	13.3	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	4	3	28.6	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	49	43	13.0	No Limit
EA033-A: Actual Acidity (QC Lot: 4169135)									
EP2201330-003	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.6	9.6	0.0	0% - 20%
EP2201330-017	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.3	9.3	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 4169135)									
EP2201330-003	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	<0.005	18.2	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2201330-017	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	<0.005	18.2	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 4169135)									
EP2201330-003	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	53.2	53.3	0.2	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	17.0	17.1	0.2	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	10600	10600	0.2	0% - 20%
EP2201330-017	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	17.9	18.0	0.6	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA033-C: Acid Neutralising Capacity (QC Lot: 4169135) - continued									
EP2201330-017	Anonymous	EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	5.75	5.78	0.5	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	3580	3610	0.6	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 4169135)									
EP2201330-003	Anonymous	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2201330-017	Anonymous	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA029-A: pH Measurements (QCLot: 4169137)								
EA029: pH KCl (23A)	----	----	pH Unit	----	5.047 pH Unit	96.5	94.3	105
EA029: pH OX (23B)	----	----	pH Unit	----	3.5615 pH Unit	105	91.7	120
EA029-B: Acidity Trail (QCLot: 4169137)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	93.2	80.4	108
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	55.0798 mole H+ / t	102	91.1	117
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 4169137)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	0.05325 % S	96.9	75.8	130
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	0.158 % S	84.6	81.7	122
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 4169137)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.020	0.22305 % Ca	91.9	84.5	128
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.020	0.2064 % Ca	92.0	82.6	119
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values (QCLot: 4169137)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	0.12082 % Mg	84.3	77.5	120
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.020	0.18219 % Mg	91.9	80.6	111
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	----	----	----	----
EA033-A: Actual Acidity (QCLot: 4169135)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	104	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 4169135)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	99.0	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 4169135)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EA033-C: Acid Neutralising Capacity (QCLot: 4169135) - continued								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 4169135)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201332**	Page	: 1 of 5
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 01-Feb-2022
Site	: ----	Issue Date	: 14-Feb-2022
Sampler	: Nick Taylor	No. of samples received	: 6
Order number	: ----	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201334**	Page	: 1 of 11
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 31-Jan-2022 11:45
Order number	: ----	Date Analysis Commenced	: 08-Feb-2022
C-O-C number	: ----	Issue Date	: 14-Feb-2022 18:29
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 25		
No. of samples analysed	: 25		

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Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- This work order is a Rebatch of EP2201008.
- EA033-WA is not NATA accredited off an unpulverised portion.
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil, multiply reported results x wet bulk density of soil in t/m3.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS6_0.25	ASS6_1.0	ASS7_0.25	ASS7_0.75	ASS13_0.0
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201334-001	EP2201334-002	EP2201334-003	EP2201334-004	EP2201334-005
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	9.4	----	----	9.4	9.4
pH OX (23B)	----	0.1	pH Unit	8.3	----	----	8.2	8.3
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	<2	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	----	<2	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	<0.005	----	----	<0.005	<0.005
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	<0.005	----	----	<0.005	<0.005
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	<0.005	----	----	<0.005	<0.005
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	0.099	----	----	0.080	0.083
Peroxide Sulfur (23De)	----	0.005	% S	0.210	----	----	0.112	0.161
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	0.111	----	----	0.032	0.078
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	69	----	----	20	49
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	0.249	----	----	0.248	0.247
Peroxide Calcium (23Wh)	----	0.005	% Ca	17.4	----	----	11.2	14.9
Acid Reacted Calcium (23X)	----	0.005	% Ca	17.2	----	----	11.0	14.7
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	8560	----	----	5470	7330
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	13.7	----	----	8.76	11.8
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	0.128	----	----	0.080	0.099
Peroxide Magnesium (23Tm)	----	0.005	% Mg	1.90	----	----	0.483	1.53
Acid Reacted Magnesium (23U)	----	0.005	% Mg	1.77	----	----	0.403	1.43
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	1460	----	----	331	1170
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	2.34	----	----	0.531	1.88
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	47.2	----	----	26.6	40.6
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	9430	----	----	5310	8120
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	15.1	----	----	8.50	13.0

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS6_0.25	ASS6_1.0	ASS7_0.25	ASS7_0.75	ASS13_0.0
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201334-001	EP2201334-002	EP2201334-003	EP2201334-004	EP2201334-005
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	----	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	----	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.11	----	----	0.03	0.08
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	69	----	----	20	49
Liming Rate excluding ANC	----	1	kg CaCO3/t	5	----	----	1	4
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	9.4	9.6	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	<2	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	<0.02	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.341	0.035	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	213	22	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	25.7	27.8	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	5130	5550	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	8.23	8.89	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	1.5	----	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	<0.02	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	<10	----	----
Liming Rate	----	1	kg CaCO3/t	----	<1	<1	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.34	0.04	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	213	22	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	16	2	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS13_1.0	ASS15_0.25	ASS15_1.0	ASS15_1.75	ASS16_0.0
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201334-006	EP2201334-007	EP2201334-008	EP2201334-009	EP2201334-010
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	----	9.5	----	----
pH OX (23B)	----	0.1	pH Unit	----	----	8.3	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	<2	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	<2	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	<2	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	----	----	<0.005	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	----	----	<0.005	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	----	----	<0.005	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	----	----	0.029	----	----
Peroxide Sulfur (23De)	----	0.005	% S	----	----	0.039	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	----	----	0.010	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	----	----	6	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	----	----	0.223	----	----
Peroxide Calcium (23Wh)	----	0.005	% Ca	----	----	17.6	----	----
Acid Reacted Calcium (23X)	----	0.005	% Ca	----	----	17.3	----	----
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	----	----	8650	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	----	----	13.9	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	----	----	0.036	----	----
Peroxide Magnesium (23Tm)	----	0.005	% Mg	----	----	0.434	----	----
Acid Reacted Magnesium (23U)	----	0.005	% Mg	----	----	0.398	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	----	----	327	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	----	----	0.525	----	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	----	----	43.0	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	----	8580	----	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	----	----	13.7	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS13_1.0	ASS15_0.25	ASS15_1.0	ASS15_1.75	ASS16_0.0
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201334-006	EP2201334-007	EP2201334-008	EP2201334-009	EP2201334-010
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	**1.5**	----	----
Net Acidity (sulfur units)	----	0.02	% S	----	----	<0.02	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	<10	----	----
Liming Rate	----	1	kg CaCO3/t	----	----	<1	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	----	<0.02	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	----	<10	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	----	<1	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.5**	**9.5**	----	**9.6**	**9.6**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	----	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	----	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	----	<0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	----	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**15.6**	**38.2**	----	**65.7**	**56.8**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**3120**	**7640**	----	**13100**	**11300**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**5.01**	**12.2**	----	**21.0**	**18.2**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	----	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	----	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	----	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	----	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	----	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	----	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	----	<1	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS16_1.0	ASS16_2.0	ASS16_3.0	ASS17_0.0	ASS17_0.5
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201334-011	EP2201334-012	EP2201334-013	EP2201334-014	EP2201334-015
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	9.7	----	----	----	9.7
pH OX (23B)	----	0.1	pH Unit	8.3	----	----	----	8.4
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	----	----	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	<0.005	----	----	----	<0.005
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	<0.005	----	----	----	<0.005
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	<0.005	----	----	----	<0.005
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	0.026	----	----	----	<0.005
Peroxide Sulfur (23De)	----	0.005	% S	0.044	----	----	----	0.007
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	0.018	----	----	----	0.006
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	11	----	----	----	<5
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	0.199	----	----	----	0.196
Peroxide Calcium (23Wh)	----	0.005	% Ca	17.6	----	----	----	13.7
Acid Reacted Calcium (23X)	----	0.005	% Ca	17.4	----	----	----	13.5
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	8710	----	----	----	6720
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	14.0	----	----	----	10.8
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	0.048	----	----	----	0.047
Peroxide Magnesium (23Tm)	----	0.005	% Mg	1.02	----	----	----	0.871
Acid Reacted Magnesium (23U)	----	0.005	% Mg	0.971	----	----	----	0.824
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	799	----	----	----	677
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	1.28	----	----	----	1.09
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	47.2	----	----	----	38.0
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	9420	----	----	----	7600
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	15.1	----	----	----	12.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS16_1.0	ASS16_2.0	ASS16_3.0	ASS17_0.0	ASS17_0.5
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201334-011	EP2201334-012	EP2201334-013	EP2201334-014	EP2201334-015
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.02**	----	----	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**11**	----	----	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	**1**	----	----	----	<1
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	**9.7**	**9.6**	**9.7**	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	<2	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	<0.02	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	<0.005	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	<10	<10	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	**76.4**	**35.3**	**28.1**	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	**15300**	**7040**	**5620**	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	**24.5**	**11.3**	**9.01**	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	**1.5**	**1.5**	**1.5**	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	<0.02	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	<10	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	<1	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	<0.02	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	<10	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	<1	<1	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC15	ASS6_1.0 Unground	ASS7_0.25 Unground	ASS13_1.0 Unground	ASS15_0.25 Unground
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201334-016	EP2201334-017	EP2201334-018	EP2201334-019	EP2201334-020
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	**9.6**	----	----	----	----
pH OX (23B)	----	0.1	pH Unit	**8.4**	----	----	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	----	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	<0.005	----	----	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	<0.005	----	----	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	<0.005	----	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	<0.005	----	----	----	----
Peroxide Sulfur (23De)	----	0.005	% S	**0.007**	----	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	**0.006**	----	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	<5	----	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	**0.203**	----	----	----	----
Peroxide Calcium (23Wh)	----	0.005	% Ca	**12.4**	----	----	----	----
Acid Reacted Calcium (23X)	----	0.005	% Ca	**12.2**	----	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	**6110**	----	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	**9.79**	----	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	**0.039**	----	----	----	----
Peroxide Magnesium (23Tm)	----	0.005	% Mg	**0.586**	----	----	----	----
Acid Reacted Magnesium (23U)	----	0.005	% Mg	**0.547**	----	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	**450**	----	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	**0.722**	----	----	----	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	**35.1**	----	----	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	**7010**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC15	ASS6_1.0 Unground	ASS7_0.25 Unground	ASS13_1.0 Unground	ASS15_0.25 Unground
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201334-016	EP2201334-017	EP2201334-018	EP2201334-019	EP2201334-020
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	11.2	----	----	----	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	9.5	9.7	9.7	9.5
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.386	0.022	<0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	241	14	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	22.9	35.9	11.3	35.8
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	4570	7170	2260	7160
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	7.33	11.5	3.63	11.5
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	----	<1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.39	0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	241	14	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	18	1	<1	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS15_1.75 Unground	ASS16_0.0 Unground	ASS16_2.0 Unground	ASS16_3.0 Unground	ASS17_0.0 Unground
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201334-021	EP2201334-022	EP2201334-023	EP2201334-024	EP2201334-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	9.8	9.7	9.9	9.7	9.7
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	<0.005	<0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	61.2	45.4	60.7	24.0	22.4
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	12200	9070	12100	4800	4470
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	19.6	14.5	19.4	7.70	7.17
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2201334**	Page	: 1 of 8
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 31-Jan-2022
Order number	: ----	Date Analysis Commenced	: 08-Feb-2022
C-O-C number	: ----	Issue Date	: 14-Feb-2022
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 25		
No. of samples analysed	: 25		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA029-A: pH Measurements (QC Lot: 4169137)									
EP2201330-001	Anonymous	EA029: pH KCl (23A)	----	0.1	pH Unit	9.4	9.4	0.0	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	8.3	8.4	0.0	0% - 20%
EP2201334-005	ASS13_0.0	EA029: pH KCl (23A)	----	0.1	pH Unit	9.4	9.4	0.0	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	8.3	8.3	0.0	0% - 20%
EA029-B: Acidity Trail (QC Lot: 4169137)									
EP2201330-001	Anonymous	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EP2201334-005	ASS13_0.0	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EA029-C: Sulfur Trail (QC Lot: 4169137)									
EP2201330-001	Anonymous	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.129	0.120	6.9	0% - 20%
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.189	0.184	2.7	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA029-C: Sulfur Trail (QC Lot: 4169137) - continued									
EP2201330-001	Anonymous	EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.060	0.063	5.7	0% - 50%
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	37	40	5.7	No Limit
EP2201334-005	ASS13_0.0	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.083	0.083	0.0	0% - 50%
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.161	0.152	5.3	0% - 20%
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.078	0.070	11.5	0% - 50%
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	49	43	11.5	No Limit
EA029-D: Calcium Values (QC Lot: 4169137)									
EP2201330-001	Anonymous	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.282	0.261	7.4	0% - 20%
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	14.3	14.1	1.2	0% - 20%
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	14.0	13.9	1.1	0% - 20%
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	11.2	11.1	1.1	0% - 20%
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	7000	6920	1.1	0% - 20%
EP2201334-005	ASS13_0.0	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.247	0.239	3.3	0% - 20%
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	14.9	14.1	5.8	0% - 20%
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	14.7	13.8	5.9	0% - 20%
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	11.8	11.1	5.9	0% - 20%
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	7330	6910	5.9	0% - 20%
EA029-E: Magnesium Values (QC Lot: 4169137)									
EP2201330-001	Anonymous	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.079	0.075	4.9	0% - 50%
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.975	0.994	1.8	0% - 20%
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	0.897	0.919	2.4	0% - 20%
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	1.18	1.21	2.4	0% - 20%
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	738	756	2.4	0% - 20%
EP2201334-005	ASS13_0.0	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.099	0.098	0.0	0% - 50%
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	1.53	1.64	7.2	0% - 20%
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	1.43	1.54	7.8	0% - 20%
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	1.88	2.04	7.8	0% - 20%
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	1170	1270	7.8	0% - 20%
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 4169137)									
EP2201330-001	Anonymous	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	37.6	37.6	0.2	0% - 20%
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	12.0	12.0	0.2	0% - 20%
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	7500	7520	0.2	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 4169137) - continued									
EP2201334-005	ASS13_0.0	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	40.6	40.5	0.3	0% - 20%
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	13.0	13.0	0.3	0% - 20%
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	8120	8100	0.3	0% - 20%
EA029-H: Acid Base Accounting (QC Lot: 4169137)									
EP2201330-001	Anonymous	EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.06	0.06	0.0	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	3	3	0.0	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	37	40	7.8	No Limit
EP2201334-005	ASS13_0.0	EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.08	0.07	13.3	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	4	3	28.6	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	49	43	13.0	No Limit
EA033-A: Actual Acidity (QC Lot: 4169135)									
EP2201330-003	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.6	9.6	0.0	0% - 20%
EP2201330-017	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.3	9.3	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 4169136)									
EP2201334-006	ASS13_1.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.5	9.6	0.0	0% - 20%
EP2201334-020	ASS15_0.25 Unground	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.5	9.4	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 4169135)									
EP2201330-003	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	<0.005	18.2	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2201330-017	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	<0.005	18.2	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA033-B: Potential Acidity (QC Lot: 4169136)									
EP2201334-006	ASS13_1.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2201334-020	ASS15_0.25 Unground	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 4169135)									
EP2201330-003	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	53.2	53.3	0.2	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	17.0	17.1	0.2	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	10600	10600	0.2	0% - 20%
EP2201330-017	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	17.9	18.0	0.6	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	5.75	5.78	0.5	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	3580	3610	0.6	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 4169136)									
EP2201334-006	ASS13_1.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	15.6	15.6	0.1	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	5.01	5.00	0.2	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	3120	3120	0.1	0% - 20%
EP2201334-020	ASS15_0.25 Unground	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	35.8	35.7	0.4	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	11.5	11.4	0.4	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	7160	7130	0.4	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 4169135)									
EP2201330-003	Anonymous	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2201330-017	Anonymous	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-E: Acid Base Accounting (QC Lot: 4169135) - continued									
EP2201330-017	Anonymous	EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 4169136)									
EP2201334-006	ASS13_1.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2201334-020	ASS15_0.25 Unground	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA029-A: pH Measurements (QCLot: 4169137)								
EA029: pH KCl (23A)	----	----	pH Unit	----	5.047 pH Unit	96.5	94.3	105
EA029: pH OX (23B)	----	----	pH Unit	----	3.5615 pH Unit	105	91.7	120
EA029-B: Acidity Trail (QCLot: 4169137)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	93.2	80.4	108
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	55.0798 mole H+ / t	102	91.1	117
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 4169137)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	0.05325 % S	96.9	75.8	130
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	0.158 % S	84.6	81.7	122
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 4169137)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.020	0.22305 % Ca	91.9	84.5	128
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.020	0.2064 % Ca	92.0	82.6	119
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values (QCLot: 4169137)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	0.12082 % Mg	84.3	77.5	120
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.020	0.18219 % Mg	91.9	80.6	111
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	----	----	----	----
EA033-A: Actual Acidity (QCLot: 4169135)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	104	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 4169136)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	99.0	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EA033-B: Potential Acidity (QCLot: 4169135)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	99.0	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 4169136)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	95.0	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 4169135)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 4169136)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 4169135)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 4169136)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201334**	Page	: 1 of 6
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 31-Jan-2022
Site	: ----	Issue Date	: 14-Feb-2022
Sampler	: Nick Taylor	No. of samples received	: 25
Order number	: ----	No. of samples analysed	: 25

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*		*Sample Date*	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA029-A: pH Measurements								
80* dried soil (EA029)								
ASS6_0.25, ASS13_0.0, ASS16_1.0, QC15	ASS7_0.75, ASS15_1.0, ASS17_0.5,	**26-Jan-2022**	**08-Feb-2022**	21-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA029-B: Acidity Trail								
80* dried soil (EA029)								
ASS6_0.25, ASS13_0.0, ASS16_1.0, QC15	ASS7_0.75, ASS15_1.0, ASS17_0.5,	**26-Jan-2022**	**08-Feb-2022**	21-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA029-C: Sulfur Trail								
80* dried soil (EA029)								
ASS6_0.25, ASS13_0.0, ASS16_1.0, QC15	ASS7_0.75, ASS15_1.0, ASS17_0.5,	**26-Jan-2022**	**08-Feb-2022**	21-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA029-D: Calcium Values								
80* dried soil (EA029)								
ASS6_0.25, ASS13_0.0, ASS16_1.0, QC15	ASS7_0.75, ASS15_1.0, ASS17_0.5,	**26-Jan-2022**	**08-Feb-2022**	21-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA029-E: Magnesium Values								
80* dried soil (EA029)								
ASS6_0.25, ASS13_0.0, ASS16_1.0, QC15	ASS7_0.75, ASS15_1.0, ASS17_0.5,	**26-Jan-2022**	**08-Feb-2022**	21-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-F: Excess Acid Neutralising Capacity							
80* dried soil (EA029) ASS6_0.25, ASS7_0.75, ASS13_0.0, ASS15_1.0, ASS16_1.0, ASS17_0.5, QC15	**26-Jan-2022**	**08-Feb-2022**	21-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA029-G: Retained Acidity							
80* dried soil (EA029) ASS6_0.25, ASS7_0.75, ASS13_0.0, ASS15_1.0, ASS16_1.0, ASS17_0.5, QC15	**26-Jan-2022**	**08-Feb-2022**	21-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA029-H: Acid Base Accounting							
80* dried soil (EA029) ASS6_0.25, ASS7_0.75, ASS13_0.0, ASS15_1.0, ASS16_1.0, ASS17_0.5, QC15	**26-Jan-2022**	**08-Feb-2022**	21-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA033-A: Actual Acidity							
80* dried soil (EA033) ASS6_1.0, ASS7_0.25, ASS13_1.0, ASS15_0.25, ASS15_1.75, ASS16_0.0, ASS16_2.0, ASS16_3.0, ASS17_0.0, ASS6_1.0 - Unground, ASS7_0.25 - Unground, ASS13_1.0 - Unground, ASS15_0.25 - Unground, ASS15_1.75 - Unground, ASS16_0.0 - Unground, ASS16_2.0 - Unground, ASS16_3.0 - Unground, ASS17_0.0 - Unground	**26-Jan-2022**	**08-Feb-2022**	26-Jan-2023	✓	**11-Feb-2022**	09-May-2022	✓
EA033-B: Potential Acidity							
80* dried soil (EA033) ASS6_1.0, ASS7_0.25, ASS13_1.0, ASS15_0.25, ASS15_1.75, ASS16_0.0, ASS16_2.0, ASS16_3.0, ASS17_0.0, ASS6_1.0 - Unground, ASS7_0.25 - Unground, ASS13_1.0 - Unground, ASS15_0.25 - Unground, ASS15_1.75 - Unground, ASS16_0.0 - Unground, ASS16_2.0 - Unground, ASS16_3.0 - Unground, ASS17_0.0 - Unground	**26-Jan-2022**	**08-Feb-2022**	26-Jan-2023	✓	**11-Feb-2022**	09-May-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity							
80* dried soil (EA033)							
ASS6_1.0, ASS7_0.25, ASS13_1.0, ASS15_0.25, ASS15_1.75, ASS16_0.0, ASS16_2.0, ASS16_3.0, ASS17_0.0, ASS6_1.0 - Unground, ASS7_0.25 - Unground, ASS13_1.0 - Unground, ASS15_0.25 - Unground, ASS15_1.75 - Unground, ASS16_0.0 - Unground, ASS16_2.0 - Unground, ASS16_3.0 - Unground, ASS17_0.0 - Unground	**26-Jan-2022**	**08-Feb-2022**	26-Jan-2023	✓	**11-Feb-2022**	09-May-2022	✓
EA033-D: Retained Acidity							
80* dried soil (EA033)							
ASS6_1.0, ASS7_0.25, ASS13_1.0, ASS15_0.25, ASS15_1.75, ASS16_0.0, ASS16_2.0, ASS16_3.0, ASS17_0.0, ASS6_1.0 - Unground, ASS7_0.25 - Unground, ASS13_1.0 - Unground, ASS15_0.25 - Unground, ASS15_1.75 - Unground, ASS16_0.0 - Unground, ASS16_2.0 - Unground, ASS16_3.0 - Unground, ASS17_0.0 - Unground	**26-Jan-2022**	**08-Feb-2022**	26-Jan-2023	✓	**11-Feb-2022**	09-May-2022	✓
EA033-E: Acid Base Accounting							
80* dried soil (EA033)							
ASS6_1.0, ASS7_0.25, ASS13_1.0, ASS15_0.25, ASS15_1.75, ASS16_0.0, ASS16_2.0, ASS16_3.0, ASS17_0.0, ASS6_1.0 - Unground, ASS7_0.25 - Unground, ASS13_1.0 - Unground, ASS15_0.25 - Unground, ASS15_1.75 - Unground, ASS16_0.0 - Unground, ASS16_2.0 - Unground, ASS16_3.0 - Unground, ASS17_0.0 - Unground	**26-Jan-2022**	**08-Feb-2022**	26-Jan-2023	✓	**11-Feb-2022**	09-May-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	4	36	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	In house: Referenced to Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*		*Sample Date*	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA029-A: pH Measurements								
80* dried soil (EA029)								
ASS19_0.5,	ASS20_0.0	**27-Jan-2022**	**08-Feb-2022**	22-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA029-B: Acidity Trail								
80* dried soil (EA029)								
ASS19_0.5,	ASS20_0.0	**27-Jan-2022**	**08-Feb-2022**	22-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA029-C: Sulfur Trail								
80* dried soil (EA029)								
ASS19_0.5,	ASS20_0.0	**27-Jan-2022**	**08-Feb-2022**	22-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA029-D: Calcium Values								
80* dried soil (EA029)								
ASS19_0.5,	ASS20_0.0	**27-Jan-2022**	**08-Feb-2022**	22-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA029-E: Magnesium Values								
80* dried soil (EA029)								
ASS19_0.5,	ASS20_0.0	**27-Jan-2022**	**08-Feb-2022**	22-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA029-F: Excess Acid Neutralising Capacity								
80* dried soil (EA029)								
ASS19_0.5,	ASS20_0.0	**27-Jan-2022**	**08-Feb-2022**	22-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA029-G: Retained Acidity								
80* dried soil (EA029)								
ASS19_0.5,	ASS20_0.0	**27-Jan-2022**	**08-Feb-2022**	22-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA029-H: Acid Base Accounting								
80* dried soil (EA029)								
ASS19_0.5,	ASS20_0.0	**27-Jan-2022**	**08-Feb-2022**	22-Oct-2024	✓	**11-Feb-2022**	09-May-2022	✓
EA033-A: Actual Acidity								
80* dried soil (EA033)								
ASS20_1.5, ASS20_1.5 - Unground,	ASS20_2.0, ASS20_2.0 - Unground	**27-Jan-2022**	**08-Feb-2022**	27-Jan-2023	✓	**11-Feb-2022**	09-May-2022	✓
EA033-B: Potential Acidity								
80* dried soil (EA033)								
ASS20_1.5, ASS20_1.5 - Unground,	ASS20_2.0, ASS20_2.0 - Unground	**27-Jan-2022**	**08-Feb-2022**	27-Jan-2023	✓	**11-Feb-2022**	09-May-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity							
80* dried soil (EA033) ASS20_1.5, ASS20_2.0, ASS20_1.5 - Unground, ASS20_2.0 - Unground	**27-Jan-2022**	**08-Feb-2022**	27-Jan-2023	✓	**11-Feb-2022**	09-May-2022	✓
EA033-D: Retained Acidity							
80* dried soil (EA033) ASS20_1.5, ASS20_2.0, ASS20_1.5 - Unground, ASS20_2.0 - Unground	**27-Jan-2022**	**08-Feb-2022**	27-Jan-2023	✓	**11-Feb-2022**	09-May-2022	✓
EA033-E: Acid Base Accounting							
80* dried soil (EA033) ASS20_1.5, ASS20_2.0, ASS20_1.5 - Unground, ASS20_2.0 - Unground	**27-Jan-2022**	**08-Feb-2022**	27-Jan-2023	✓	**11-Feb-2022**	09-May-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	In house: Referenced to Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201417**	Page	: 1 of 11
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 31-Jan-2022 11:45
Order number	: ----	Date Analysis Commenced	: 11-Feb-2022
C-O-C number	: ----	Issue Date	: 17-Feb-2022 21:59
Sampler	: NICK TAYLOR/CONNOR RICHARDS		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 27		
No. of samples analysed	: 26		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ALS is not NATA accredited for the analysis of EA033 Chromium Suite using unpulverised sample. Analysis as per client request.
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- This work order is a rebatch of EP2201003.
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime ($CaCO_3$) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime ($CaCO_3$) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil, multiply reported results x wet bulk density of soil in t/m3.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS09_0.0	ASS09_1.0	ASS09_2.0	ASS09_3.0	ASS10_0.0
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201417-001	EP2201417-002	EP2201417-003	EP2201417-004	EP2201417-005
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	9.6	----	----	9.4
pH OX (23B)	----	0.1	pH Unit	----	8.1	----	----	8.1
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	----	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	<2	----	----	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	<2	----	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	----	<0.005	----	----	<0.005
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	----	<0.005	----	----	<0.005
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	----	<0.005	----	----	<0.005
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	----	0.065	----	----	0.298
Peroxide Sulfur (23De)	----	0.005	% S	----	0.077	----	----	0.327
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	----	0.012	----	----	0.029
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	----	7	----	----	18
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	----	0.218	----	----	0.363
Peroxide Calcium (23Wh)	----	0.005	% Ca	----	19.3	----	----	7.52
Acid Reacted Calcium (23X)	----	0.005	% Ca	----	19.1	----	----	7.16
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	----	9520	----	----	3570
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	----	15.2	----	----	5.72
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	----	0.060	----	----	0.271
Peroxide Magnesium (23Tm)	----	0.005	% Mg	----	0.404	----	----	1.16
Acid Reacted Magnesium (23U)	----	0.005	% Mg	----	0.344	----	----	0.888
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	----	283	----	----	730
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	----	0.454	----	----	1.17
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	----	49.9	----	----	21.8
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	9980	----	----	4350
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	----	16.0	----	----	6.97

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS09_0.0	ASS09_1.0	ASS09_2.0	ASS09_3.0	ASS10_0.0
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201417-001	EP2201417-002	EP2201417-003	EP2201417-004	EP2201417-005
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**----**	**1.5**	**----**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**----**	<0.02	**----**	**----**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	**----**	<10	**----**	**----**	<10
Liming Rate	----	1	kg CaCO3/t	**----**	<1	**----**	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**----**	<0.02	**----**	**----**	**0.03**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**----**	<10	**----**	**----**	**18**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**----**	**1**	**----**	**----**	**1**
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.4**	**----**	**9.5**	**9.5**	**----**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**----**	<2	<2	**----**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**----**	<0.02	<0.02	**----**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	**----**	<0.005	<0.005	**----**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**----**	<10	<10	**----**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**50.5**	**----**	**34.8**	**51.6**	**----**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**10100**	**----**	**6950**	**10300**	**----**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**16.2**	**----**	**11.1**	**16.5**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**1.5**	**----**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	<0.02	**----**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**----**	<10	<10	**----**
Liming Rate	----	1	kg CaCO3/t	<1	**----**	<1	<1	**----**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	**----**	<0.02	<0.02	**----**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	**----**	<10	<10	**----**
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**----**	<1	<1	**----**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS10_0.5	ASS10_2.0	ASS10_3.0	ASS11_0.0	ASS12_2.25
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201417-006	EP2201417-007	EP2201417-008	EP2201417-009	EP2201417-014
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	----	----	9.6	----
pH OX (23B)	----	0.1	pH Unit	----	----	----	8.3	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	<2	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	----	<2	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	----	----	----	<0.005	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	----	----	----	<0.005	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	----	----	----	<0.005	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	----	----	----	0.022	----
Peroxide Sulfur (23De)	----	0.005	% S	----	----	----	0.058	----
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	----	----	----	0.036	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	----	----	----	22	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	----	----	----	0.174	----
Peroxide Calcium (23Wh)	----	0.005	% Ca	----	----	----	6.88	----
Acid Reacted Calcium (23X)	----	0.005	% Ca	----	----	----	6.70	----
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	----	----	----	3340	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	----	----	----	5.36	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	----	----	----	0.043	----
Peroxide Magnesium (23Tm)	----	0.005	% Mg	----	----	----	0.587	----
Acid Reacted Magnesium (23U)	----	0.005	% Mg	----	----	----	0.544	----
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	----	----	----	448	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	----	----	----	0.718	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	----	----	----	20.3	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	----	----	4060	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	----	----	----	6.50	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS10_0.5	ASS10_2.0	ASS10_3.0	ASS11_0.0	ASS12_2.25
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201417-006	EP2201417-007	EP2201417-008	EP2201417-009	EP2201417-014
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	----	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	----	----	0.04	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	----	----	22	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	----	----	2	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	9.4	9.4	9.5	----	9.6
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	51.7	36.9	27.8	----	77.0
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	10300	7380	5560	----	15400
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	16.6	11.8	8.91	----	24.7
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	<1	----	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS14_0.0	ASS14_0.75	ASS18_0.0	ASS18_0.5	ASS18_1.5
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201417-015	EP2201417-016	EP2201417-017	EP2201417-018	EP2201417-019
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	9.6	----	----	9.5	----
pH OX (23B)	----	0.1	pH Unit	8.2	----	----	8.1	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	<2	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	----	<2	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	<0.005	----	----	<0.005	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	<0.005	----	----	<0.005	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	<0.005	----	----	<0.005	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	0.146	----	----	0.082	----
Peroxide Sulfur (23De)	----	0.005	% S	0.215	----	----	0.108	----
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	0.069	----	----	0.026	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	43	----	----	16	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	0.276	----	----	0.225	----
Peroxide Calcium (23Wh)	----	0.005	% Ca	11.1	----	----	9.45	----
Acid Reacted Calcium (23X)	----	0.005	% Ca	10.8	----	----	9.23	----
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	5390	----	----	4600	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	8.65	----	----	7.38	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	0.139	----	----	0.078	----
Peroxide Magnesium (23Tm)	----	0.005	% Mg	1.27	----	----	0.890	----
Acid Reacted Magnesium (23U)	----	0.005	% Mg	1.14	----	----	0.812	----
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	934	----	----	668	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	1.50	----	----	1.07	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	30.4	----	----	26.6	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	6080	----	----	5310	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	9.74	----	----	8.50	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS14_0.0	ASS14_0.75	ASS18_0.0	ASS18_0.5	ASS18_1.5
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201417-015	EP2201417-016	EP2201417-017	EP2201417-018	EP2201417-019
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	**1.5**	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	<10	----
Liming Rate	----	1	kg CaCO3/t	<1	----	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.07**	----	----	**0.03**	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**43**	----	----	**16**	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	**3**	----	----	**1**	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	**9.6**	**9.4**	----	**9.6**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	<0.005	<0.005	----	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	<10	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	**14.0**	**49.4**	----	**66.8**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	**2790**	**9880**	----	**13300**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	**4.47**	**15.8**	----	**21.4**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	**1.5**	**1.5**	----	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	----	<1	<1	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	<0.02	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	<10	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	<1	----	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC7	ASS09_2.0 Unground	ASS09_3.0 Unground	ASS10_0.5 Unground	ASS10_2.0 Unground
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201417-021	EP2201417-024	EP2201417-025	EP2201417-026	EP2201417-027
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	9.4	9.6	9.7	9.5	9.5
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	<0.005	<0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	2.00	33.6	44.2	48.6	35.3
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	400	6710	8840	9720	7050
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.64	10.8	14.2	15.6	11.3
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS10_3.0 Unground	ASS12_2.25 Unground	ASS14_0.75 Unground	ASS18_0.0 Unground	ASS18_1.5 Unground
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201417-028	EP2201417-032	EP2201417-033	EP2201417-034	EP2201417-035
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	9.5	9.6	9.8	9.4	9.7
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	<0.005	<0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	22.0	72.8	11.0	38.2	61.9
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	4400	14600	2200	7640	12400
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	7.05	23.3	3.54	12.2	19.8
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS11_1.0	----	----	----	----
			Sampling date / time	25-Jan-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2201417-037	--------	--------	--------	--------
				Result	----	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.6**	----	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**2.75**	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**549**	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.88**	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	----	----	----

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2201417**	Page	: 1 of 6
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 31-Jan-2022
Order number	: ----	Date Analysis Commenced	: 11-Feb-2022
C-O-C number	: ----	Issue Date	: 17-Feb-2022
Sampler	: NICK TAYLOR/CONNOR RICHARDS		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 27		
No. of samples analysed	: 26		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA029-A: pH Measurements (QC Lot: 4173729)									
EP2201417-002	ASS09_1.0	EA029: pH KCl (23A)	----	0.1	pH Unit	9.6	9.6	0.0	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	8.1	8.2	2.1	0% - 20%
EA029-B: Acidity Trail (QC Lot: 4173729)									
EP2201417-002	ASS09_1.0	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EA029-C: Sulfur Trail (QC Lot: 4173729)									
EP2201417-002	ASS09_1.0	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.065	0.064	0.0	0% - 50%
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.077	0.080	3.8	0% - 50%
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.012	0.016	28.2	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	7	10	28.2	No Limit
EA029-D: Calcium Values (QC Lot: 4173729)									
EP2201417-002	ASS09_1.0	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.218	0.227	3.9	0% - 20%
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	19.3	19.9	2.9	0% - 20%
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	19.1	19.6	2.9	0% - 20%
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	15.2	15.7	2.9	0% - 20%
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	9520	9800	2.9	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA029-E: Magnesium Values (QC Lot: 4173729)									
EP2201417-002	ASS09_1.0	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.060	0.061	2.2	0% - 50%
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.404	0.404	0.0	0% - 20%
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	0.344	0.343	0.4	0% - 20%
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	0.454	0.452	0.4	0% - 20%
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	283	282	0.4	0% - 20%
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 4173729)									
EP2201417-002	ASS09_1.0	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	49.9	50.1	0.3	0% - 20%
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	16.0	16.0	0.3	0% - 20%
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	9980	10000	0.3	0% - 20%
EA029-H: Acid Base Accounting (QC Lot: 4173729)									
EP2201417-002	ASS09_1.0	EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	0.02	0.0	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	1	0.0	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	10	0.0	No Limit
EA033-A: Actual Acidity (QC Lot: 4173734)									
EP2201417-001	ASS09_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.4	9.4	0.0	0% - 20%
EP2201417-021	QC7	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.4	9.4	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 4173735)									
EP2201417-037	ASS11_1.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.6	9.6	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 4173734)									
EP2201417-001	ASS09_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2201417-021	QC7	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 4173735)									

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA033-B: Potential Acidity (QC Lot: 4173735) - continued									
EP2201417-037	ASS11_1.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 4173734)									
EP2201417-001	ASS09_0.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	50.5	50.3	0.4	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	16.2	16.1	0.4	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	10100	10000	0.4	0% - 20%
EP2201417-021	QC7	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	2.00	1.96	2.0	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.64	0.63	1.6	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	400	391	2.3	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 4173735)									
EP2201417-037	ASS11_1.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	2.75	2.75	0.0	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.88	0.88	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	549	549	0.0	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 4173734)									
EP2201417-001	ASS09_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EP2201417-021	QC7	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-E: Acid Base Accounting (QC Lot: 4173735)									
EP2201417-037	ASS11_1.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA029-A: pH Measurements (QCLot: 4173729)								
EA029: pH KCl (23A)	----	----	pH Unit	----	5.047 pH Unit	98.5	94.3	105
EA029: pH OX (23B)	----	----	pH Unit	----	3.5615 pH Unit	100.0	91.7	120
EA029-B: Acidity Trail (QCLot: 4173729)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	93.1	80.4	108
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	55.0798 mole H+ / t	102	91.1	117
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 4173729)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	0.05325 % S	97.8	75.8	130
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	0.158 % S	87.0	81.7	122
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 4173729)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.020	0.22305 % Ca	93.4	84.5	128
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.020	0.2064 % Ca	97.3	82.6	119
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values (QCLot: 4173729)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	0.12082 % Mg	82.4	77.5	120
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.020	0.18219 % Mg	98.7	80.6	111
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	----	----	----	----
EA033-A: Actual Acidity (QCLot: 4173734)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	93.3	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 4173735)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	93.1	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EA033-B: Potential Acidity (QCLot: 4173734)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	108	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 4173735)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	104	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 4173734)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 4173735)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 4173734)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 4173735)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201417**	Page	: 1 of 6
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 31-Jan-2022
Site	: ----	Issue Date	: 17-Feb-2022
Sampler	: NICK TAYLOR/CONNOR RICHARDS	No. of samples received	: 27
Order number	: ----	No. of samples analysed	: 26

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA029-A: pH Measurements							
80* dried soil (EA029) ASS09_1.0, ASS10_0.0, ASS11_0.0, ASS14_0.0, ASS18_0.5	**25-Jan-2022**	**11-Feb-2022**	20-Oct-2024	✓	**15-Feb-2022**	12-May-2022	✓
EA029-B: Acidity Trail							
80* dried soil (EA029) ASS09_1.0, ASS10_0.0, ASS11_0.0, ASS14_0.0, ASS18_0.5	**25-Jan-2022**	**11-Feb-2022**	20-Oct-2024	✓	**15-Feb-2022**	12-May-2022	✓
EA029-C: Sulfur Trail							
80* dried soil (EA029) ASS09_1.0, ASS10_0.0, ASS11_0.0, ASS14_0.0, ASS18_0.5	**25-Jan-2022**	**11-Feb-2022**	20-Oct-2024	✓	**15-Feb-2022**	12-May-2022	✓
EA029-D: Calcium Values							
80* dried soil (EA029) ASS09_1.0, ASS10_0.0, ASS11_0.0, ASS14_0.0, ASS18_0.5	**25-Jan-2022**	**11-Feb-2022**	20-Oct-2024	✓	**15-Feb-2022**	12-May-2022	✓
EA029-E: Magnesium Values							
80* dried soil (EA029) ASS09_1.0, ASS10_0.0, ASS11_0.0, ASS14_0.0, ASS18_0.5	**25-Jan-2022**	**11-Feb-2022**	20-Oct-2024	✓	**15-Feb-2022**	12-May-2022	✓
EA029-F: Excess Acid Neutralising Capacity							
80* dried soil (EA029) ASS09_1.0, ASS10_0.0, ASS11_0.0, ASS14_0.0, ASS18_0.5	**25-Jan-2022**	**11-Feb-2022**	20-Oct-2024	✓	**15-Feb-2022**	12-May-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-G: Retained Acidity							
80* dried soil (EA029) ASS09_1.0, ASS10_0.0, ASS11_0.0, ASS14_0.0, ASS18_0.5	**25-Jan-2022**	**11-Feb-2022**	20-Oct-2024	✓	**15-Feb-2022**	12-May-2022	✓
EA029-H: Acid Base Accounting							
80* dried soil (EA029) ASS09_1.0, ASS10_0.0, ASS11_0.0, ASS14_0.0, ASS18_0.5	**25-Jan-2022**	**11-Feb-2022**	20-Oct-2024	✓	**15-Feb-2022**	12-May-2022	✓
EA033-A: Actual Acidity							
80* dried soil (EA033) ASS09_0.0, ASS09_2.0, ASS09_3.0, ASS10_0.5, ASS10_2.0, ASS10_3.0, ASS12_2.25, ASS14_0.75, ASS18_0.0, ASS18_1.5, QC7, ASS09_2.0 - Unground, ASS09_3.0 - Unground, ASS10_0.5 - Unground, ASS10_2.0 - Unground, ASS10_3.0 - Unground, ASS12_2.25 - Unground, ASS14_0.75 - Unground, ASS18_0.0 - Unground, ASS18_1.5 - Unground, ASS11_1.0	**25-Jan-2022**	**11-Feb-2022**	25-Jan-2023	✓	**15-Feb-2022**	12-May-2022	✓
EA033-B: Potential Acidity							
80* dried soil (EA033) ASS09_0.0, ASS09_2.0, ASS09_3.0, ASS10_0.5, ASS10_2.0, ASS10_3.0, ASS12_2.25, ASS14_0.75, ASS18_0.0, ASS18_1.5, QC7, ASS09_2.0 - Unground, ASS09_3.0 - Unground, ASS10_0.5 - Unground, ASS10_2.0 - Unground, ASS10_3.0 - Unground, ASS12_2.25 - Unground, ASS14_0.75 - Unground, ASS18_0.0 - Unground, ASS18_1.5 - Unground, ASS11_1.0	**25-Jan-2022**	**11-Feb-2022**	25-Jan-2023	✓	**15-Feb-2022**	12-May-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity							
80* dried soil (EA033)							
ASS09_0.0, ASS09_2.0, ASS09_3.0, ASS10_0.5, ASS10_2.0, ASS10_3.0, ASS12_2.25, ASS14_0.75, ASS18_0.0, ASS18_1.5, QC7, ASS09_2.0 - Unground, ASS09_3.0 - Unground, ASS10_0.5 - Unground, ASS10_2.0 - Unground, ASS10_3.0 - Unground, ASS12_2.25 - Unground, ASS14_0.75 - Unground, ASS18_0.0 - Unground, ASS18_1.5 - Unground, ASS11_1.0	**25-Jan-2022**	**11-Feb-2022**	25-Jan-2023	✓	**15-Feb-2022**	12-May-2022	✓
EA033-D: Retained Acidity							
80* dried soil (EA033)							
ASS09_0.0, ASS09_2.0, ASS09_3.0, ASS10_0.5, ASS10_2.0, ASS10_3.0, ASS12_2.25, ASS14_0.75, ASS18_0.0, ASS18_1.5, QC7, ASS09_2.0 - Unground, ASS09_3.0 - Unground, ASS10_0.5 - Unground, ASS10_2.0 - Unground, ASS10_3.0 - Unground, ASS12_2.25 - Unground, ASS14_0.75 - Unground, ASS18_0.0 - Unground, ASS18_1.5 - Unground, ASS11_1.0	**25-Jan-2022**	**11-Feb-2022**	25-Jan-2023	✓	**15-Feb-2022**	12-May-2022	✓
EA033-E: Acid Base Accounting							
80* dried soil (EA033)							
ASS09_0.0, ASS09_2.0, ASS09_3.0, ASS10_0.5, ASS10_2.0, ASS10_3.0, ASS12_2.25, ASS14_0.75, ASS18_0.0, ASS18_1.5, QC7, ASS09_2.0 - Unground, ASS09_3.0 - Unground, ASS10_0.5 - Unground, ASS10_2.0 - Unground, ASS10_3.0 - Unground, ASS12_2.25 - Unground, ASS14_0.75 - Unground, ASS18_0.0 - Unground, ASS18_1.5 - Unground, ASS11_1.0	**25-Jan-2022**	**11-Feb-2022**	25-Jan-2023	✓	**15-Feb-2022**	12-May-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	3	21	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	In house: Referenced to Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Lewis Duffy

From: Weekes, Bernie <BERNIE.WEEKES@coffey.com>
Sent: Tuesday, 8 February 2022 2:41 PM
To: ALS Enviro Perth
Subject: [EXTERNAL] - RE: RESULTS & EDD for ALS Workorder : EP2201003 | Your Reference: 754-PEREN295751 Perdaman

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi Rebecca,
I'd like to request further testing on the following ASS samples:
5 day tat required.

1 ASS09_0.0: EA033-WA on both ground and unground portions to determine variation in ANC
2 ASS09_1.0: EA029
3 ASS09_2.0: EA033-WA on both ground and unground portions to determine variation in ANC
4 ASS09_3.0: EA033-WA on both ground and unground portions to determine variation in ANC

5 ASS10_0.0: EA029
6 ASS10_0.5: EA033-WA on both ground and unground portions to determine variation in ANC
7 ASS10_2.0: EA033-WA on both ground and unground portions to determine variation in ANC
8 ASS10_3.0: EA033-WA on both ground and unground portions to determine variation in ANC

9 ASS11_0.0: EA029
10 ASS11_1.0: EA033-WA on both ground and unground portions to determine variation in ANC

11 ASS12_0.0: EA033-WA on both ground and unground portions to determine variation in ANC
12 ASS12_0.5: EA029
13 ASS12_1.5: EA033-WA on both ground and unground portions to determine variation in ANC
14 ASS12_2.25: EA033-WA on both ground and unground portions to determine variation in ANC

15 ASS14_0.0: EA029
16 ASS14_0.75: EA033-WA on both ground and unground portions to determine variation in ANC

17 ASS18_0.0: EA033-WA on both ground and unground portions to determine variation in ANC
18 ASS18_0.5: EA029
19 ASS18_1.5: EA033-WA on both ground and unground portions to determine variation in ANC

20 QC5: Hold

21 QC7: EA033-WA on both ground and unground portions to determine variation in ANC

22 QC9: EA029

Regards,

Bernie Weekes, GradCertProjMgt, BSc (EnvMgt)/BBus | Principal Environmental Co
Mobile **+61 407 817 762** Business **+61 8 6218 2161** | bernie.weekes@tetratech.com

From: angel-no-reply@alsglobal.com <angel-no-reply@alsglobal.com>
Sent: Tuesday, February 8, 2022 10:41 AM

Environmental Division
Perth
Work Order Reference
EP2201417

Telephone : +61-8-9406 1301

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES
Invoices to: COFFEY ACCOUNTS
Mobile: 0407 817 762
Phone:
Email: bernie.weekes@coffey.com ~~@tetratech.com~~
Email: @tetratech.com

Project No: 754_PEREN295751
Task No: LAB
Project Name: PERDAMAN
Laboratory: ALS
Sampler's Name: NICK TAYLOR/CONNOR RICHARDS
Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S2	EP231X	EP262	W16T	W04	HOLD	NOTES
1	SS24_0m	25/1/22		SOIL	2J, 1P	5 DAY		X	X	X				EMAIL EA037 RESULTS TO BERNIE (PM) ASAP.
2	SS24_0.5m							X	X	X				
3	SS24_1.0m												X	
4	SS24_2.0m												X	
5	ASS10_0m				1Z		X							
6	ASS10_0.25m						X							
7	ASS10_0.5m						X							
8	ASS10_0.75m						X							
9	ASS10_1.0m						X							
10	ASS10_1.25m						X							
11	ASS10_1.5m						X							
12	ASS10_1.75m						X							
13	ASS10_2.0m						X							
14	ASS10_2.25m						X							
15	ASS10_2.5m						X							
16	ASS10_2.75m						X							

Environmental Division Perth
Work Order Reference
EP2201003

RELINQUISHED BY		RECEIVED BY	
Name: NICK TAYLOR	Date: 26/1/22	Name: LOUFFY	Date: 31/1/22
Coffey	Time: 15:45	Company: ALS	Time: 1145
Name:	Date:	Name:	Date:
Company:	Time:	Company:	Time:

Samp
All Sa
All D
Samp
Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES
Invoices to: COFFEY ACCOUNTS
Mobile: 0407 817 762
Phone:
Email: bernie.weekes@coffey.com @tetratech.com
Email: @tetratech.com

Project No: 754 – PERTH 295751
Task No: LAB
Project Name: PERDAMAN
Laboratory: ALS
Sampler's Name: CONNOR RICHARDS / NICK TAYLOR
Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S2	EP231X	EP262	W/6T	WCL HOLD	NOTES
17	AS510 – 3.0m	25/1/22		SOIL	1Z	5 DAY	X						
18	AS59 – 0m	↓		↓	↓	↓	X						EMAIL EA037 RESULTS TO BERNIE(km) ASAP.
19	AS59 – 0.25m						X						
20	AS59 – 0.5m						X						
21	AS59 – 0.75m						X						
22	AS59 – 1.0m						X						
23	AS59 – 1.25m						X						
24	AS59 – 1.5m						X						
25	AS59 – 1.75m						X						
26	AS59 – 2m						X						
27	AS59 – 2.25m						X						
28	AS59 – 2.5m						X						
29	AS59 – 2.75m						X						
30	AS59 – 3m						X						
31	SS22 – 0m				↓		X						
32	SS22 – 0.5m				2J, 1P			X	X	X		X	
					2J, 1P								

RELINQUISHED BY

Name: NICK TAYLOR
Coffey
Date: 26/1/22
Time: 15:45

Name:
Company:
Date:
Time:

RECEIVED BY

Name:
Company:
Date:
Time:

Name:
Company:
Date:
Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES — Mobile: 0407 817 762 — Email: bernie.weekes@coffey.com
Invoices to: — Phone: — Email: @tetratech.com

Project No: 754_PERTH295751 — Task No: LAB
Project Name: PERDAMAN — Laboratory: ALS
Sampler's Name: CONNOR RICHARDS/NICK TAYLOR — Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S2	EP231X	EP262	W16T	W04	HOLD	NOTES
33	SS22_1.0m	25/1/22		SOIL	2G, 1P	5 DAY		X	X	X				EMAIL EA037 RESULTS TO BERNIE (BM) ASAP.
34	SS22_2.0m				2J, 1P								X	
35	AS11_0m				1Z		X							
36	AS11_0.25m						X							
37	AS11_0.5m						X							
38	AS11_0.75m						X							
39	AS11_1.0m						X							
SNR40	AS11_1.25m						X							
SNR41	AS11_1.5m						X							
SNR42	AS11_1.75m						X							
SNR43	AS11_2m						X							
SNR44	AS11_2.25m						X							
SNR45	AS11_2.5m						X							
SNR46	AS11_2.75m						X							
SNR47	AS11_3m						X							
40 48	AS12_0m						X							

RELINQUISHED BY

Name: NICK TAYLOR — Date: 26/1/22 →
Coffey — Time: 15.45

Name: — Date: →
Company: — Time:

RECEIVED BY

Name: — Date:
Company: — Time:

Name: — Date:
Company: — Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES — Mobile: 0407 817 762 — Email: bernie.weekes@coffey.com
Invoices to: COFFEY ACCOUNTS. — Phone: — Email: @tetratech.com

Project No: 754_PERGN295751 — Task No: LAB
Project Name: PERDAMAN — Laboratory: ALS
Sampler's Name: CONNOR RICHARDS / NICK TAYLOR — Project Manager: BERNIE WEEKES
Quote number (If different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section: EA037, S2, EP231X, EP262, W16T, W04, HP, S13, S26

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S2	EP231X	EP262	W16T	W04	HP	S13	S26	NOTES
41 ~~44~~	AS512_0.25m	25/1/22		SOIL	1Z	5DAY	X									EMAIL EA037 RESULTS TO BERNIE (AM) ASAP
42 ~~50~~	AS512_0.5m						X									
43 ~~51~~	AS512_0.75m						X									
44 ~~52~~	AS512_1.0m						X									
45 ~~53~~	AS512_1.25m						X									
46 ~~54~~	AS512_1.5m						X									
47 ~~55~~	AS512_1.75m						X									
48 ~~56~~	AS512_2m						X									
49 ~~57~~	AS512_2.25m						X									
50 ~~58~~	AS512_2.5m						X									
51 ~~59~~	AS512_2.75m						X									
52 ~~60~~	AS512_3m						X									
53 ~~61~~	SS25_0m				2J, 1P				X	X				X	X	
54 ~~62~~	SS25_0.5m								X	X				X	X	
55 ~~63~~	SS25_1.0m								X	X				X	X	
56 ~~64~~	SS25_2.0m												X			

RELINQUISHED BY

Name: NICK TAYLOR — Date: 26/1/22 →
Coffey — Time: 15:45

Name: — Date: →
Company: — Time:

RECEIVED BY

Name: — Date:
Company: — Time:

Name: — Date:
Company: — Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES
Invoices to: COFFEY ACCOUNTS
Mobile: 0407 817 762
Phone:
Email: bernie.weekes@coffey.com @tetratech.com
Email: @tetratech.com

Project No: 754_PEREN295751
Task No: LAB
Project Name: PERDAMAN
Laboratory: ALS
Sampler's Name: NICK TAYLOR | CONNOR RICHARDS
Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S2	EP231X	EP262	W164	W104 HOLD	S12	S26					NOTES
57	AS518_0m	25/1/22		SOIL	1Z	5DAY	X												EMAIL EA037 RESULTS TO BERNIE(AM) ASAP.
58	AS518_0.25m						X												
59	AS518_0.5m						X												
60	AS518_0.75m						X												
61	AS518_1.0m						X												
62	AS518_1.25m						X												
63	AS518_1.5m						X												
64	AS518_1.75m						X												
65	AS518_2m						X												
66	AS518_2.25m						X												
67	AS518_2.5m						X												
68	AS514_0m						X												
69	AS514_0.25m						X												
70	AS514_0.5m						X												
71	AS514_0.75m						X												
72	SS26_0m				2J, 1P				X	X			X	X					

RELINQUISHED BY

Name: NICK TAYLOR
Coffey
Date: 25/1/22
Time: 15:45

Name:
Company:
Date:
Time:

RECEIVED BY

Name:
Company:
Date:
Time:

Name:
Company:
Date:
Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES
Invoices to: COFFEY ACCOUNTS
Mobile: 0407 817 762
Phone:
Email: bernie.weekes@coffey.com ~~@tetratech.com~~
Email: @tetratech.com

Project No: 754_PER EN295751
Task No: LAB
Project Name: PERDAMAN
Laboratory: ALS
Sampler's Name: NICK TAYLOR / CONNOR RICHARDS
Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S26	EP231X	EP262	W16T	W04	HOLD	S13	S2	W-7	W-04		NOTES
73	SS26_0.5m	25/11/22		SOIL	2J, 1P	5 DAY		X	X	X				X					EMAIL EO37 RESULTS TO BERNIE(PM) ASAP.
74	SS26_1m												X						
75	SS21_0m							X	X	X				X					
76	SS21_0.5m							X	X	X				X					
77	SS21_1.0m												X						
78	SS21_2.0m												X						
79	QC3								X	X			X						PLEASE FILTER METALS BOTTLES.
EUR	QC4								X	X					X				
80	QC5				1Z		X		X	X					X				
81	QC6												X						PLEASE FORWARD QC4 TO EUROFINS & ASK THEM TO ADOPT SAME LEVELS OF REPORTING.
82	QC7						X						X						
83	QC8						X												
84	QC9												X						
85	QC10						X												
86	QC11			WATER	2G, 3P, 2V								X						
87	QC12			WATER	1G, 2V				X	X						X	X		

RELINQUISHED BY

Name: NICK TAYLOR
Coffey
Date: 26/11/22
Time: 15:45.

Name:
Company:
Date:
Time:

RECEIVED BY

Name:
Company:
Date:
Time:

Name:
Company:
Date:
Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201790**	Page	: 1 of 4
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman Contam and ASS	Date Samples Received	: 16-Feb-2022 11:30
Order number	: ----	Date Analysis Commenced	: 16-Feb-2022
C-O-C number	: ----	Issue Date	: 18-Feb-2022 14:36
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
~ = Indicates an estimated value.

- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS22_0	ASS22_0.25	ASS22_0.5	ASS22_0.75	ASS22_1.0
			Sampling date / time	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201790-001	EP2201790-002	EP2201790-003	EP2201790-004	EP2201790-005
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.0**	**8.2**	**8.8**	**8.4**	**8.5**
pH (Fox)	----	0.1	pH Unit	**6.6**	**7.7**	**8.6**	**8.3**	**8.6**
Reaction Rate	----	1	-	**Extreme**	**Extreme**	**Extreme**	**Extreme**	**Extreme**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS22_1.25	ASS22_1.5	ASS22_1.75	ASS22_2.0	----
			Sampling date / time	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201790-006	EP2201790-007	EP2201790-008	EP2201790-009	--------
				Result	Result	Result	Result	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.6**	**8.3**	**8.5**	**9.0**	**----**
pH (Fox)	----	0.1	pH Unit	**8.8**	**7.9**	**8.4**	**7.5**	**----**
Reaction Rate	----	1	-	**Extreme**	**Extreme**	**Extreme**	**Extreme**	**----**

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2201790**	Page	: 1 of 3
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman Contam and ASS	Date Samples Received	: 16-Feb-2022
Order number	: ----	Date Analysis Commenced	: 16-Feb-2022
C-O-C number	: ----	Issue Date	: 18-Feb-2022
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA037: Ass Field Screening Analysis (QC Lot: 4182380)									
EP2201790-001	ASS22_0	EA037: pH (F)	----	0.1	pH Unit	8.0	8.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.6	6.6	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

- **No Method Blank (MB) or Laboratory Control Spike (LCS) Results are required to be reported.**

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201790**	Page	: 1 of 4
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman Contam and ASS	Date Samples Received	: 16-Feb-2022
Site	: ----	Issue Date	: 18-Feb-2022
Sampler	: SANJANA AUDIT	No. of samples received	: 9
Order number	: ----	No. of samples analysed	: 9

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / ***Container*** / *Client Sample ID(s)*		***Sample Date***	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen on receipt at ALS (EA037)								
ASS22_0,	ASS22_0.25,	**12-Feb-2022**	**16-Feb-2022**	11-Aug-2022	✓	**16-Feb-2022**	11-Aug-2022	✓
ASS22_0.5,	ASS22_0.75,							
ASS22_1.0,	ASS22_1.25,							
ASS22_1.5,	ASS22_1.75,							
ASS22_2.0								

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Drying only	EN020D	SOIL	In house

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office: Tetra Tech Coffey - Perth

Report Results to: Bernie Weekes Mobile: 407817762 Email: bernie.weekes@coffey.com

Invoices to: accounts.perth@tetratech.com Phone: Email: @tetratech.com

Project No: 754-PEREN295751 Task No:

Project Name: Perdaman Contam and ASS Laboratory: ALS

Sampler's Name: Sanjana Audit Project Manager: Bernie Weekes

Quote number (if different to current quoted prices):

Special Instructions: 48hr tat required

Analysis Request Section

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	EA029	EA033										NOTES
1	ASS22_0	12.2.22	PM	Soil	1Z	5-days	X												
2	ASS22_0.25	12.2.22	PM	Soil	1Z	5-days	X												
3	ASS22_0.50	12.2.22	PM	Soil	1Z	5-days	X												
4	ASS22_0.75	12.2.22	PM	Soil	1Z	5-days	X												
5	ASS22_1.0	12.2.22	PM	Soil	1Z	5-days	X												
6	ASS22_1.25	12.2.22	PM	Soil	1Z	5-days	X												
7	ASS22_1.50	12.2.22	PM	Soil	1Z	5-days	X												
8	ASS22_1.75	12.2.22	PM	Soil	1Z	5-days	X												
9	ASS22_2.0	12.2.22	PM	Soil	1Z	5-days	X												

Environmental Division Perth
Work Order Reference
EP2201790
Telephone : -- 61-8-9406 1301

RELINQUISHED BY		RECEIVED BY	
Name: Sanjana Audit 14.2.22	Date:	Name:	Date: 16/2
Coffey	Time:	Company: ALS	Time: 1130
Name:	Date:	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐

All Documentation is in Proper Order ☐

Samples Received Properly Chilled ☐

Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201953**	Page	: 1 of 4
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman Contam and ASS	Date Samples Received	: 16-Feb-2022 11:30
Order number	: ----	Date Analysis Commenced	: 22-Feb-2022
C-O-C number	: ----	Issue Date	: 25-Feb-2022 17:20
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/046/21		
No. of samples received	: 5		
No. of samples analysed	: 5		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Re-batch of EP2201790.
- EA033 (Chromium Suite) is not NATA accredited off an unpulverised portion.
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil, multiply reported results x wet bulk density of soil in t/m3.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS22_0.0	ASS22_0.5	ASS22_1.0	ASS22_0.0 Unground	ASS22_1.0 Unground
			Sampling date / time	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201953-001	EP2201953-002	EP2201953-003	EP2201953-004	EP2201953-005
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	9.1	----	----	----
pH OX (23B)	----	0.1	pH Unit	----	9.5	----	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	<2	----	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.005	% pyrite S	----	<0.005	----	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.005	% pyrite S	----	<0.005	----	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.005	% pyrite S	----	<0.005	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.005	% S	----	0.005	----	----	----
Peroxide Sulfur (23De)	----	0.005	% S	----	0.012	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.005	% S	----	0.007	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	5	mole H+ / t	----	<5	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.005	% Ca	----	0.258	----	----	----
Peroxide Calcium (23Wh)	----	0.005	% Ca	----	2.57	----	----	----
Acid Reacted Calcium (23X)	----	0.005	% Ca	----	2.31	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	5	mole H+ / t	----	1150	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.005	% S	----	1.85	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.005	% Mg	----	0.069	----	----	----
Peroxide Magnesium (23Tm)	----	0.005	% Mg	----	0.174	----	----	----
Acid Reacted Magnesium (23U)	----	0.005	% Mg	----	0.105	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	5	mole H+ / t	----	86	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.005	% S	----	0.138	----	----	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	----	6.11	----	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	1220	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS22_0.0	ASS22_0.5	ASS22_1.0	ASS22_0.0 Unground	ASS22_1.0 Unground
			Sampling date / time	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201953-001	EP2201953-002	EP2201953-003	EP2201953-004	EP2201953-005
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	----	1.95	----	----	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	8.6	----	9.1	8.5	9.1
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	----	0.005	<0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	1.60	----	7.59	1.17	7.37
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	320	----	1520	233	1470
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.51	----	2.43	0.37	2.36
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	<0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	<10	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	<1	<1	<1

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2201953**	Page	: 1 of 6
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman Contam and ASS	Date Samples Received	: 16-Feb-2022
Order number	: ----	Date Analysis Commenced	: 22-Feb-2022
C-O-C number	: ----	Issue Date	: 25-Feb-2022
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/046/21		
No. of samples received	: 5		
No. of samples analysed	: 5		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA029-A: pH Measurements (QC Lot: 4196752)									
EP2201953-002	ASS22_0.5	EA029: pH KCl (23A)	----	0.1	pH Unit	9.1	9.1	0.0	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	9.5	9.4	1.3	0% - 20%
EA029-B: Acidity Trail (QC Lot: 4196752)									
EP2201953-002	ASS22_0.5	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.005	<0.005	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EA029-C: Sulfur Trail (QC Lot: 4196752)									
EP2201953-002	ASS22_0.5	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.005	<0.005	0.0	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.012	0.012	0.0	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.007	0.008	22.2	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<5	5	0.0	No Limit
EA029-D: Calcium Values (QC Lot: 4196752)									
EP2201953-002	ASS22_0.5	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.258	0.244	5.6	0% - 20%
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	2.57	2.67	3.8	0% - 20%
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	2.31	2.42	4.8	0% - 20%
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	1.85	1.94	4.9	0% - 20%
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	1150	1210	4.9	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA029-E: Magnesium Values (QC Lot: 4196752)									
EP2201953-002	ASS22_0.5	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.069	0.064	6.6	0% - 50%
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.174	0.182	4.9	0% - 20%
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	0.105	0.118	11.8	0% - 20%
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	0.138	0.156	11.8	0% - 20%
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	86	97	11.8	0% - 50%
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 4196752)									
EP2201953-002	ASS22_0.5	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	6.11	6.12	0.3	0% - 20%
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	1.95	1.96	0.3	0% - 20%
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	1220	1220	0.3	0% - 20%
EA029-H: Acid Base Accounting (QC Lot: 4196752)									
EP2201953-002	ASS22_0.5	EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-A: Actual Acidity (QC Lot: 4188631)									
EP2201953-001	ASS22_0.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.6	8.6	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 4188631)									
EP2201953-001	ASS22_0.0	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 4188631)									
EP2201953-001	ASS22_0.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	1.60	1.60	0.0	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.51	0.51	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	320	319	0.0	0% - 20%
EA033-E: Acid Base Accounting (QC Lot: 4188631)									
EP2201953-001	ASS22_0.0	EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.0	No Limit
		EA033: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-E: Acid Base Accounting (QC Lot: 4188631) - continued									
EP2201953-001	ASS22_0.0	EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit
		EA033: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA029-A: pH Measurements (QCLot: 4196752)								
EA029: pH KCl (23A)	----	----	pH Unit	----	5.047 pH Unit	95.9	94.3	105
EA029: pH OX (23B)	----	----	pH Unit	----	3.5615 pH Unit	106	91.7	120
EA029-B: Acidity Trail (QCLot: 4196752)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	93.2	80.4	108
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	55.0798 mole H+ / t	104	91.1	117
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 4196752)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	0.05325 % S	91.4	75.8	130
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	0.14364 % S	91.3	81.7	122
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 4196752)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.020	0.22305 % Ca	101	84.5	128
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.020	0.2116 % Ca	98.8	82.6	119
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values (QCLot: 4196752)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	0.12082 % Mg	91.1	77.5	120
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.020	0.15751 % Mg	90.3	80.6	111
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	----	----	----	----
EA033-A: Actual Acidity (QCLot: 4188631)								
EA033: pH KCl (23A)	----	0.1	pH Unit	<0.1	----	----	----	----
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	22.26 mole H+ / t	93.2	79.4	110
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 4188631)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.202 % S	101	84.6	110
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 4188631)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EA033-C: Acid Neutralising Capacity (QCLot: 4188631) - continued								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	4.9 % CaCO3	102	98.1	108
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting (QCLot: 4188631)								
EA033: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA033: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA033: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201953**	Page	: 1 of 5
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman Contam and ASS	Date Samples Received	: 16-Feb-2022
Site	: ----	Issue Date	: 25-Feb-2022
Sampler	: SANJANA AUDIT	No. of samples received	: 5
Order number	: ----	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-A: pH Measurements							
80* dried soil (EA029) ASS22_0.5	**12-Feb-2022**	**22-Feb-2022**	07-Nov-2024	✓	**25-Feb-2022**	23-May-2022	✓
EA029-B: Acidity Trail							
80* dried soil (EA029) ASS22_0.5	**12-Feb-2022**	**22-Feb-2022**	07-Nov-2024	✓	**25-Feb-2022**	23-May-2022	✓
EA029-C: Sulfur Trail							
80* dried soil (EA029) ASS22_0.5	**12-Feb-2022**	**22-Feb-2022**	07-Nov-2024	✓	**25-Feb-2022**	23-May-2022	✓
EA029-D: Calcium Values							
80* dried soil (EA029) ASS22_0.5	**12-Feb-2022**	**22-Feb-2022**	07-Nov-2024	✓	**25-Feb-2022**	23-May-2022	✓
EA029-E: Magnesium Values							
80* dried soil (EA029) ASS22_0.5	**12-Feb-2022**	**22-Feb-2022**	07-Nov-2024	✓	**25-Feb-2022**	23-May-2022	✓
EA029-F: Excess Acid Neutralising Capacity							
80* dried soil (EA029) ASS22_0.5	**12-Feb-2022**	**22-Feb-2022**	07-Nov-2024	✓	**25-Feb-2022**	23-May-2022	✓
EA029-G: Retained Acidity							
80* dried soil (EA029) ASS22_0.5	**12-Feb-2022**	**22-Feb-2022**	07-Nov-2024	✓	**25-Feb-2022**	23-May-2022	✓
EA029-H: Acid Base Accounting							
80* dried soil (EA029) ASS22_0.5	**12-Feb-2022**	**22-Feb-2022**	07-Nov-2024	✓	**25-Feb-2022**	23-May-2022	✓
EA033-A: Actual Acidity							
80* dried soil (EA033) ASS22_0.0, ASS22_1.0, ASS22_0.0 - Unground, ASS22_1.0 - Unground	**12-Feb-2022**	**23-Feb-2022**	12-Feb-2023	✓	**25-Feb-2022**	24-May-2022	✓
EA033-B: Potential Acidity							
80* dried soil (EA033) ASS22_0.0, ASS22_1.0, ASS22_0.0 - Unground, ASS22_1.0 - Unground	**12-Feb-2022**	**23-Feb-2022**	12-Feb-2023	✓	**25-Feb-2022**	24-May-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity							
80* dried soil (EA033) ASS22_0.0, ASS22_1.0, ASS22_0.0 - Unground, ASS22_1.0 - Unground	**12-Feb-2022**	**23-Feb-2022**	12-Feb-2023	✓	**25-Feb-2022**	24-May-2022	✓
EA033-D: Retained Acidity							
80* dried soil (EA033) ASS22_0.0, ASS22_1.0, ASS22_0.0 - Unground, ASS22_1.0 - Unground	**12-Feb-2022**	**23-Feb-2022**	12-Feb-2023	✓	**25-Feb-2022**	24-May-2022	✓
EA033-E: Acid Base Accounting							
80* dried soil (EA033) ASS22_0.0, ASS22_1.0, ASS22_0.0 - Unground, ASS22_1.0 - Unground	**12-Feb-2022**	**23-Feb-2022**	12-Feb-2023	✓	**25-Feb-2022**	24-May-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	In house: Referenced to Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Lewis Duffy

From: Weekes, Bernie <BERNIE.WEEKES@coffey.com>
Sent: Friday, 18 February 2022 3:02 PM
To: ALS Enviro Perth
Subject: [EXTERNAL] - RE: RESULTS & EDD for ALS Workorder : EP2201790 | Your Reference: 754-PEREN295751 Perdaman Contam and ASS

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi,
I'd like to request further analysis on the following samples for this order.

1+4 ASS22_0.0: EA033-WA on both ground and unground portions to determine variation in ANC
2 ASS22_0.5: EA029
3+5 ASS22_1.0: EA033-WA on both ground and unground portions to determine variation in ANC

Cheers

Bernie Weekes, GradCertProjMgt, BSc (EnvMgt)/BBus | Principal Environmental Consultant
Mobile **+61 407 817 762** Business **+61 8 6218 2161** | bernie.weekes@tetratech.com

From: angel-no-reply@alsglobal.com <angel-no-reply@alsglobal.com>
Sent: Friday, February 18, 2022 2:37 PM
To: Weekes, Bernie <BERNIE.WEEKES@coffey.com>
Subject: RESULTS & EDD for ALS Workorder : EP2201790 | Your Reference: 754-PEREN295751 Perdaman Contam and ASS

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Environmental Division
Perth
Work Order Reference
EP2201953

Telephone : -- 61-8-9406 1301

Deliverables for ALS Workorder EP2201790

Project: 754-PEREN295751 Perdaman Contam and ASS

Dear Bernie Weekes,

Please find enclosed the following deliverables for **EP2201790**:

- 754-PEREN295751 Perdaman Contam and ASS.ESDAT_EP2201790_0.Chemistry2e.CSV

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Page ____ of ____

TETRA TECH COFFEY

Consigning Office: Tetra Tech Coffey - Perth

Report Results to: Bernie Weekes Mobile: 407817762 Email: bernie.weekes@coffey.com

Invoices to: accounts.perth@tetratech.com Phone: Email: @tetratech.com

Project No: 754-PEREN295751 Task No:

Project Name: Perdaman Contam and ASS Laboratory: ALS

Sampler's Name: Sanjana Audit Project Manager: Bernie Weekes

Quote number (if different to current quoted prices):

Special Instructions: 48hr tat required

Analysis Request Section

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	EA029	EA033									NOTES
1	ASS22_0	12.2.22	PM	Soil	1Z	5-days	X											
2	ASS22_0.25	12.2.22	PM	Soil	1Z	5-days	X											
3	ASS22_0.50	12.2.22	PM	Soil	1Z	5-days	X											
4	ASS22_0.75	12.2.22	PM	Soil	1Z	5-days	X											
5	ASS22_1.0	12.2.22	PM	Soil	1Z	5-days	X											
6	ASS22_1.25	12.2.22	PM	Soil	1Z	5-days	X											
7	ASS22_1.50	12.2.22	PM	Soil	1Z	5-days	X											
8	ASS22_1.75	12.2.22	PM	Soil	1Z	5-days	X											
9	ASS22_2.0	12.2.22	PM	Soil	1Z	5-days	X											

Environmental Division Perth
Work Order Reference
EP2201790

RELINQUISHED BY		RECEIVED BY	
Name: Sanjana Audit 14.2.22	Date:	Name:	Date: 16/2
Company: Coffey	Time:	Company: ALS	Time: 1130
Name:	Date:	Name:	Date:
Company:	Time:	Company:	Time:

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric A
Ice, ST - Sodium Thiosulfate, NP - No Preservative

Chain of custody
Issued: 30 July 2020
UNCONTROLLED WHEN PRINTED

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2200878**	Page	: 1 of 16
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 724-PEREN295751 PERDAMAN	Date Samples Received	: 27-Jan-2022 10:30
Order number	: ----	Date Analysis Commenced	: 27-Jan-2022
C-O-C number	: ----	Issue Date	: 03-Feb-2022 09:47
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 19		
No. of samples analysed	: 18		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS and EP262 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG005: Poor matrix spike recovery was obtained for As due to possible sample matrix interference. Results have been confirmed by re-extraction and re-analysis.
- EP262: ALS is not NATA accredited for the analysis of MDEA.
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS23_0m	SS23_0.5m	ASS8_0m	ASS8_0.25m	ASS8_0.5m
			Sampling date / time	24-Jan-2022 11:00	24-Jan-2022 11:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2200878-001	EP2200878-002	EP2200878-004	EP2200878-005	EP2200878-006
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	----	----	8.1	8.4	8.3
pH (Fox)	----	0.1	pH Unit	----	----	6.9	7.0	7.1
Reaction Rate	----	1	-	----	----	Strong	Strong	Moderate
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	10.5	18.5	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	7	8	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	16	21	----	----	----
Copper	7440-50-8	5	mg/kg	6	6	----	----	----
Lead	7439-92-1	5	mg/kg	<5	<5	----	----	----
Nickel	7440-02-0	2	mg/kg	7	10	----	----	----
Zinc	7440-66-6	5	mg/kg	14	15	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS23_0m	SS23_0.5m	ASS8_0m	ASS8_0.25m	ASS8_0.5m
			Sampling date / time	24-Jan-2022 11:00	24-Jan-2022 11:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2200878-001	EP2200878-002	EP2200878-004	EP2200878-005	EP2200878-006
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS23_0m	SS23_0.5m	ASS8_0m	ASS8_0.25m	ASS8_0.5m
			Sampling date / time	24-Jan-2022 11:00	24-Jan-2022 11:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2200878-001	EP2200878-002	EP2200878-004	EP2200878-005	EP2200878-006
				Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued								
Sum of PFAS	----	0.0002	mg/kg	**0.0002**	<0.0002	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0002**	<0.0002	----	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	10	mg/kg	<10	<10	----	----	----
Diethanolamine	111-42-2	10	mg/kg	<10	<10	----	----	----
Methyl diethanolamine (MDEA)	105-59-9	10	mg/kg	<10	<10	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**114**	**101**	----	----	----
13C8-PFOA	----	0.0002	%	**102**	**103**	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS8_0.75m	ASS8_1.00m	ASS8_1.25m	ASS8_1.5m	ASS8_1.75m
			Sampling date / time	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2200878-007	EP2200878-008	EP2200878-009	EP2200878-010	EP2200878-011
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.2**	**8.5**	**8.7**	**8.8**	**9.0**
pH (Fox)	----	0.1	pH Unit	**7.0**	**7.8**	**6.8**	**6.9**	**6.7**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS8_2m	ASS8_2.25m	ASS8_2.5m	ASS8_2.75m	ASS8_3m
			Sampling date / time	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00	24-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2200878-012	EP2200878-013	EP2200878-014	EP2200878-015	EP2200878-016
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**9.2**	**9.0**	**8.4**	**9.0**	**9.0**
pH (Fox)	----	0.1	pH Unit	**6.8**	**6.8**	**6.8**	**6.9**	**7.0**
Reaction Rate	----	1	-	**Slight**	**Moderate**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC1	QC2	TBW44	----	----
			Sampling date / time	24-Jan-2022 12:30	24-Jan-2022 12:30	24-Jan-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2200878-017	EP2200878-018	EP2200878-019	--------	--------
				Result	Result	Result	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	<1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	<0.5	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	----	----	----	----
beta-BHC	319-85-7	0.5	µg/L	<0.5	----	----	----	----
gamma-BHC	58-89-9	0.5	µg/L	<0.5	----	----	----	----
delta-BHC	319-86-8	0.5	µg/L	<0.5	----	----	----	----
Heptachlor	76-44-8	0.5	µg/L	<0.5	----	----	----	----
Aldrin	309-00-2	0.5	µg/L	<0.5	----	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	----	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	----	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	----	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	----	----	----	----
Dieldrin	60-57-1	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDE	72-55-9	0.5	µg/L	<0.5	----	----	----	----
Endrin	72-20-8	0.5	µg/L	<0.5	----	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDD	72-54-8	0.5	µg/L	<0.5	----	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	----	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDT	50-29-3	2.0	µg/L	<2.0	----	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	----	----	----	----
Methoxychlor	72-43-5	2.0	µg/L	<2.0	----	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC1	QC2	TBW44	----	----
			Sampling date / time	24-Jan-2022 12:30	24-Jan-2022 12:30	24-Jan-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2200878-017	EP2200878-018	EP2200878-019	--------	--------
				Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	<0.5	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	----	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	----	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	----	----	----	----
Dimethoate	60-51-5	0.5	µg/L	<0.5	----	----	----	----
Diazinon	333-41-5	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	----	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	----	----	----	----
Malathion	121-75-5	0.5	µg/L	<0.5	----	----	----	----
Fenthion	55-38-9	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	----	----	----	----
Parathion	56-38-2	2.0	µg/L	<2.0	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	----	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	----	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	----	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	----	----	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	----	----	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	----	----	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	----	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC1	QC2	TBW44	----	----
			Sampling date / time	24-Jan-2022 12:30	24-Jan-2022 12:30	24-Jan-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2200878-017	EP2200878-018	EP2200878-019	--------	--------
				Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC1	QC2	TBW44	----	----
			Sampling date / time	24-Jan-2022 12:30	24-Jan-2022 12:30	24-Jan-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2200878-017	EP2200878-018	EP2200878-019	--------	--------
				Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	----	----	<0.0005	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	----	----	<0.0005	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	----	----	<0.0002	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC1	QC2	TBW44	----	----
			Sampling date / time	24-Jan-2022 12:30	24-Jan-2022 12:30	24-Jan-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2200878-017	EP2200878-018	EP2200878-019	--------	--------
				Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	----	----	<0.0020	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	----	----	<0.0005	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	----	----	<0.0005	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	----	----	<0.0005	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC1	QC2	TBW44	----	----
			Sampling date / time	24-Jan-2022 12:30	24-Jan-2022 12:30	24-Jan-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2200878-017	EP2200878-018	EP2200878-019	--------	--------
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	----	----	<0.0005	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	----	----	<0.001	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	----	----	<0.001	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	----	----	<0.001	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	----	----	<0.001	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	----	----	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	----	----	<0.0005	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	----	----	<0.001	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	----	----	<0.001	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	----	----	<0.001	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	----	----	<0.001	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC1	QC2	TBW44	----	----
			Sampling date / time	24-Jan-2022 12:30	24-Jan-2022 12:30	24-Jan-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2200878-017	EP2200878-018	EP2200878-019	--------	--------
				Result	Result	Result	----	----
EP231P: PFAS Sums - Continued								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	----	----	<0.0002	----	----
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	----	----	<0.0002	----	----
^ Sum of PFAS	----	0.0002	µg/L	----	----	<0.0002	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<1	----	----	----	----
Diethanolamine	111-42-2	1	µg/L	<1	----	----	----	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	----	----	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	1	%	72.3	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	81.5	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	71.9	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	20.4	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	51.4	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	47.2	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	64.1	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%	87.1	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	89.1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	115	90.4	----	----	----
Toluene-D8	2037-26-5	2	%	106	98.7	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	108	100	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	112	----	----	----	----
13C8-PFOA	----	0.02	%	99.1	----	----	----	----
13C4-PFOS	----	0.0005	%	----	----	103	----	----
13C8-PFOA	----	0.0005	%	----	----	100	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	45	134
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	67	111
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	67	111
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP262: Ethanolamines
(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids
(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids
(SOIL) EP231C: Perfluoroalkyl Sulfonamides
(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids
(SOIL) EP231P: PFAS Sums
(SOIL) EP231S: PFAS Surrogate
(WATER) EP066: Polychlorinated Biphenyls (PCB)
(WATER) EP066S: PCB Surrogate
(WATER) EP068A: Organochlorine Pesticides (OC)
(WATER) EP068B: Organophosphorus Pesticides (OP)
(WATER) EP068S: Organochlorine Pesticide Surrogate
(WATER) EP068T: Organophosphorus Pesticide Surrogate
(WATER) EP075(SIM)B: Polynuclear Aromatic Hydrocarbons
(WATER) EP075(SIM)T: PAH Surrogates
(WATER) EP075(SIM)S: Phenolic Compound Surrogates
(WATER) EP262: Ethanolamines
(WATER) EP231A: Perfluoroalkyl Sulfonic Acids
(WATER) EP231B: Perfluoroalkyl Carboxylic Acids
(WATER) EP231C: Perfluoroalkyl Sulfonamides
(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids
(WATER) EP231P: PFAS Sums
(WATER) EP231S: PFAS Surrogate

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology). Only applies to samples EP2200878 (017).

(WATER) EP080/071: Total Petroleum Hydrocarbons
(WATER) EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions
(WATER) EP080: BTEXN
(WATER) EP080S: TPH(V)/BTEX Surrogates

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2200878**	Page	: 1 of 15
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 724-PEREN295751 PERDAMAN	Date Samples Received	: 27-Jan-2022
Order number	: ----	Date Analysis Commenced	: 27-Jan-2022
C-O-C number	: ----	Issue Date	: 03-Feb-2022
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 19		
No. of samples analysed	: 18		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4142564)									
EP2200727-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	5	5	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.0	No Limit
EP2200693-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	45	47	3.1	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	8	8	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	2970	2870	3.2	0% - 20%
		EG005T: Lead	7439-92-1	5	mg/kg	70	74	5.6	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	3140	3010	4.2	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 4142897)									
EP2200878-004	ASS8_0m	EA037: pH (F)	----	0.1	pH Unit	8.1	8.1	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.9	6.9	0.0	0% - 20%
EP2200878-013	ASS8_2.25m	EA037: pH (F)	----	0.1	pH Unit	9.0	9.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.8	6.8	0.0	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4142573)									
EP2200878-001	SS23_0m	EA055: Moisture Content	----	0.1	%	10.5	10.9	3.9	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4142567)									
EP2200727-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4142567) - continued									
EP2200693-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4144794)									
EP2200866-005	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0002	0.0003	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
ES2202692-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4144794)									
EP2200866-005	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
ES2202692-002	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4144794)									
EP2200866-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4144794) - continued									
EP2200866-005	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2202692-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4144794)									
EP2200866-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2202692-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4144794) - continued									
ES2202692-002	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 4142720)									
EP2200851-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0052	<0.0052	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.052	<0.052	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.468	0.471	0.7	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.064	0.066	2.3	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.052	<0.052	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.344	0.354	3.2	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.558	0.584	4.5	No Limit
EP2200891-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.002	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.004	0.003	30.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4142726)									
EP2200851-003	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0005	<0.0005	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4143492)									
EP2200878-018	QC2	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4145930)									
ES2203006-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES2203019-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4143492)									
EP2200878-018	QC2	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4145930)									
ES2203006-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
ES2203019-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 4143492)									
EP2200878-018	QC2	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP080: BTEXN (QC Lot: 4145930)									
ES2203006-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
ES2203019-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP262: Ethanolamines (QC Lot: 4144452)									
EP2200864-001	Anonymous	EP262: Ethanolamine	141-43-5	1	µg/L	<10	<10	0.0	No Limit
		EP262: Diethanolamine	111-42-2	1	µg/L	<10	<10	0.0	No Limit
		EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<10	<10	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4142564)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	100	81.5	118
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	93.8	76.2	106
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	80.0	66.9	138
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	100	79.1	113
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	96.5	78.9	112
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	93.8	81.5	126
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	97.8	81.0	119
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4142567)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.154 mg/kg	112	81.0	115
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4144794)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.2	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.6	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4144794)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	82.8	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.6	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.8	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.6	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	122	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4144794)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.9	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	125	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	99.4	68.7	130

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4144794) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	125	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4144794)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	88.4	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	93.2	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	92.0	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	96.4	69.2	143

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 4142720)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	105	89.6	118
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.5	89.2	116
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.4	87.8	114
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	99.5	85.8	115
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.6	88.4	111
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.6	87.4	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	88.1	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4142726)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	106	85.1	115
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4145285)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	97.5	68.9	113
EP068A: Organochlorine Pesticides (OC) (QCLot: 4145284)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	82.2	64.9	107
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	82.7	58.3	111
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	95.2	69.0	117
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	86.3	70.0	112
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	92.2	68.9	110
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	86.0	65.2	108
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	86.9	65.8	109
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	90.6	67.1	107
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	91.8	64.1	110
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	92.3	66.7	112
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	89.1	63.2	111

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4145284) - continued								
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	107	65.2	113
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	90.9	66.0	112
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	104	65.2	113
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	92.2	67.3	114
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	95.5	72.0	122
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	92.5	66.9	109
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	86.2	65.2	112
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	91.4	65.2	112
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	91.8	63.8	110
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	100	61.1	114
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4145284)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	100	65.6	114
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	92.8	63.7	113
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	25.8	19.7	48.0
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	89.7	69.5	110
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	101	71.1	110
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	90.9	77.0	119
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	94.6	70.0	124
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	94.6	68.4	116
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	92.3	68.6	112
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	94.9	75.0	119
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	95.9	67.0	121
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	89.0	69.0	121
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	105	71.8	110
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	84.1	67.5	112
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	96.8	64.1	116
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	90.4	67.8	114
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	88.0	74.0	120
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	78.7	66.2	114
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	105	51.6	128
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4145287)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	77.3	50.0	94.0
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	74.2	63.6	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	69.2	62.2	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	72.2	63.9	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	94.0	62.6	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	83.2	64.3	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	88.5	63.6	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	88.3	63.1	118

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4145287) - continued								
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	97.1	64.1	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	93.6	62.5	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	95.2	61.7	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	94.0	63.0	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	99.4	63.3	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	91.7	59.9	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	87.1	61.2	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	90.9	59.1	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4142523)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	59.0	39.3	103
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	60.3	47.2	122
EP071: C29 - C36 Fraction	----	50	µg/L	<50	380 µg/L	55.6	42.5	119
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4143492)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	113	73.6	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4145286)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	89.7	55.8	112
EP071: C15 - C28 Fraction	----	100	µg/L	<100	600 µg/L	93.5	71.6	113
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	106	56.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4145930)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	103	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4142523)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	398 µg/L	60.2	42.0	104
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	49.5	46.2	116
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	96.4	24.7	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4143492)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	113	73.9	115
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4145286)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	500 µg/L	73.5	57.9	119
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	700 µg/L	82.2	62.5	110
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	300 µg/L	80.0	61.5	121
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4145930)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	107	75.0	127
EP080: BTEXN (QCLot: 4143492)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	99.8	84.1	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	114	81.0	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	105	84.4	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080: BTEXN (QCLot: 4143492) - continued								
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	104	84.3	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	101	86.5	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	104	77.0	118
EP080: BTEXN (QCLot: 4145930)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	106	70.0	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	109	69.0	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	105	70.0	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	104	69.0	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	108	72.0	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	110	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4144541)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	92.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	78.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	85.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	78.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	80.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	81.6	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4145941)								
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	94.4	72.0	130
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	74.0	71.0	127
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	80.0	68.0	131
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	122	69.0	134
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	89.2	65.0	140
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	81.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4144541)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	90.3	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	93.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	111	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	99.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	92.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	85.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	96.0	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	92.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	93.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	80.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	110	71.0	132

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4145941)								
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	80.6	73.0	129
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	94.0	72.0	129
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	120	72.0	129
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	86.0	72.0	130
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	86.0	71.0	133
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	76.0	69.0	130
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	82.4	71.0	129
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	88.4	69.0	133
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	98.8	72.0	134
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	102	65.0	144
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	78.2	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4144541)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	92.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	82.1	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	83.1	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	98.6	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	96.8	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	86.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	82.2	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4145941)								
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	97.6	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	100	68.0	141
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	83.2	56.6	136
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	89.0	61.9	129
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	87.0	52.8	135
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	82.8	65.0	136
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	76.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4144541)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	81.4	63.0	143

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4144541) - continued								
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	77.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	92.0	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	96.8	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4145941)								
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	84.8	63.0	143
EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.004 µg/L	83.6	64.0	140
EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.004 µg/L	88.4	67.0	138
EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	0.004 µg/L	80.8	60.9	136
EP231P: PFAS Sums (QCLot: 4145941)								
EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	----	----	----	----
EP262: Ethanolamines (QCLot: 4144452)								
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	107	50.0	130
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	106	50.0	130
EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	10 µg/L	110	50.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4142564)							
EP2200693-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	# 51.0	70.0	130
		EG005T: Cadmium	7440-43-9	12.5 mg/kg	98.4	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	90.3	70.0	130
		EG005T: Copper	7440-50-8	50 mg/kg	# Not Determined	70.0	130
		EG005T: Lead	7439-92-1	50 mg/kg	105	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	95.4	70.0	130
		EG005T: Zinc	7440-66-6	50 mg/kg	# Not Determined	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4142567)							
EP2200693-001	Anonymous	EG035T: Mercury	7439-97-6	1 mg/kg	109	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4144794)							

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4144794) - continued							
EP2200866-005	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	86.0	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	76.0	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	80.8	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	78.8	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	72.8	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	94.8	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4144794)							
EP2200866-005	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	89.6	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	86.0	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	105	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	96.4	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	89.6	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	108	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	110	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	94.8	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	90.0	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	73.6	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	104	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4144794)							
EP2200866-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	96.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	89.7	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	110	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	92.5	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	121	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	98.4	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	86.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4144794)							
EP2200866-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	82.4	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	99.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	98.0	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	92.4	69.2	143

Sub-Matrix: **WATER**

Matrix Spike (MS) Report: Spike	SpikeRecovery(%)	Acceptable Limits (%)

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 4142720)							
EP2200851-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	112	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	101	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	98.9	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	107	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	98.1	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	107	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	109	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4142726)							
EP2200878-017	QC1	EG035T: Mercury	7439-97-6	0.01 mg/L	99.6	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4145930)							
ES2203006-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	114	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4145930)							
ES2203006-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	114	70.0	130
EP080: BTEXN (QCLot: 4145930)							
ES2203006-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	107	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	109	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	109	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	108	70.0	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	110	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	106	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2200878**	Page	: 1 of 11
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 724-PEREN295751 PERDAMAN	Date Samples Received	: 27-Jan-2022
Site	: ----	Issue Date	: 03-Feb-2022
Sampler	: Nick Taylor	No. of samples received	: 19
Order number	: ----	No. of samples analysed	: 18

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG005(ED093)T: Total Metals by ICP-AES	EP2200693--001	Anonymous	**Arsenic**	7440-38-2	51.0 %	70.0-130%	**Recovery less than lower data quality objective**
EG005(ED093)T: Total Metals by ICP-AES	EP2200693--001	Anonymous	**Copper**	7440-50-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG005(ED093)T: Total Metals by ICP-AES	EP2200693--001	Anonymous	**Zinc**	7440-66-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA037: Ass Field Screening Analysis							
Snap Lock Bag							
ASS8_0m,	ASS8_0.25m,	27-Jan-2022	25-Jan-2022	**2**	27-Jan-2022	25-Jan-2022	**2**
ASS8_0.5m,	ASS8_0.75m,						
ASS8_1.00m,	ASS8_1.25m,						
ASS8_1.5m,	ASS8_1.75m,						
ASS8_2m,	ASS8_2.25m,						
ASS8_2.5m,	ASS8_2.75m,						
ASS8_3m							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	2	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	17	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	8	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	2	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Ethanolamines by LCMSMS	0	2	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	0	2	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	17	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Matrix Spikes (MS) - Continued					
Pesticides by GCMS	0	8	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	2	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*		*Sample Date*	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA037: Ass Field Screening Analysis								
Snap Lock Bag (EA037)								
ASS8_0m,	ASS8_0.25m,	**24-Jan-2022**	**27-Jan-2022**	25-Jan-2022	×	**27-Jan-2022**	25-Jan-2022	×
ASS8_0.5m,	ASS8_0.75m,							
ASS8_1.00m,	ASS8_1.25m,							
ASS8_1.5m,	ASS8_1.75m,							
ASS8_2m,	ASS8_2.25m,							
ASS8_2.5m,	ASS8_2.75m,							
ASS8_3m								
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
SS23_0m,	SS23_0.5m	**24-Jan-2022**	**----**	----	----	**28-Jan-2022**	07-Feb-2022	✓
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
SS23_0m,	SS23_0.5m	**24-Jan-2022**	**28-Jan-2022**	23-Jul-2022	✓	**28-Jan-2022**	23-Jul-2022	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
SS23_0m,	SS23_0.5m	**24-Jan-2022**	**28-Jan-2022**	21-Feb-2022	✓	**28-Jan-2022**	21-Feb-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
SS23_0m,	SS23_0.5m	**24-Jan-2022**	**31-Jan-2022**	23-Jul-2022	✓	**31-Jan-2022**	12-Mar-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X)								
SS23_0m,	SS23_0.5m	**24-Jan-2022**	**31-Jan-2022**	23-Jul-2022	✓	**31-Jan-2022**	12-Mar-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
SS23_0m, SS23_0.5m	**24-Jan-2022**	**31-Jan-2022**	23-Jul-2022	✓	**31-Jan-2022**	12-Mar-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
SS23_0m, SS23_0.5m	**24-Jan-2022**	**31-Jan-2022**	23-Jul-2022	✓	**31-Jan-2022**	12-Mar-2022	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
SS23_0m, SS23_0.5m	**24-Jan-2022**	**31-Jan-2022**	23-Jul-2022	✓	**31-Jan-2022**	12-Mar-2022	✓
EP262: Ethanolamines							
Soil Glass Jar - Unpreserved (EP262)							
SS23_0m, SS23_0.5m	**24-Jan-2022**	**----**	----	----	**31-Jan-2022**	07-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T)							
QC1	**24-Jan-2022**	**28-Jan-2022**	23-Jul-2022	✓	**28-Jan-2022**	23-Jul-2022	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG035T)							
QC1	**24-Jan-2022**	**----**	----	----	**28-Jan-2022**	21-Feb-2022	✓
EP066: Polychlorinated Biphenyls (PCB)							
Amber Glass Bottle - Unpreserved (EP066)							
QC1	**24-Jan-2022**	**31-Jan-2022**	31-Jan-2022	✓	**01-Feb-2022**	12-Mar-2022	✓
EP068A: Organochlorine Pesticides (OC)							
Amber Glass Bottle - Unpreserved (EP068)							
QC1	**24-Jan-2022**	**31-Jan-2022**	31-Jan-2022	✓	**01-Feb-2022**	12-Mar-2022	✓
EP068B: Organophosphorus Pesticides (OP)							
Amber Glass Bottle - Unpreserved (EP068)							
QC1	**24-Jan-2022**	**31-Jan-2022**	31-Jan-2022	✓	**01-Feb-2022**	12-Mar-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
QC1	**24-Jan-2022**	**31-Jan-2022**	31-Jan-2022	✓	**01-Feb-2022**	12-Mar-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) QC1	**24-Jan-2022**	**31-Jan-2022**	31-Jan-2022	✓	**01-Feb-2022**	12-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP071) QC2	**24-Jan-2022**	**31-Jan-2022**	31-Jan-2022	✓	**31-Jan-2022**	12-Mar-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC2	**24-Jan-2022**	**28-Jan-2022**	07-Feb-2022	✓	**28-Jan-2022**	07-Feb-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC1	**24-Jan-2022**	**31-Jan-2022**	07-Feb-2022	✓	**31-Jan-2022**	07-Feb-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) QC1	**24-Jan-2022**	**31-Jan-2022**	31-Jan-2022	✓	**01-Feb-2022**	12-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP071) QC2	**24-Jan-2022**	**31-Jan-2022**	31-Jan-2022	✓	**31-Jan-2022**	12-Mar-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC2	**24-Jan-2022**	**28-Jan-2022**	07-Feb-2022	✓	**28-Jan-2022**	07-Feb-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC1	**24-Jan-2022**	**31-Jan-2022**	07-Feb-2022	✓	**31-Jan-2022**	07-Feb-2022	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) QC2	**24-Jan-2022**	**28-Jan-2022**	07-Feb-2022	✓	**28-Jan-2022**	07-Feb-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC1	**24-Jan-2022**	**31-Jan-2022**	07-Feb-2022	✓	**31-Jan-2022**	07-Feb-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) TBW44	**24-Jan-2022**	**31-Jan-2022**	23-Jul-2022	✓	**01-Feb-2022**	23-Jul-2022	✓
HDPE (no PTFE) (EP231X) QC1	**24-Jan-2022**	**31-Jan-2022**	23-Jul-2022	✓	**31-Jan-2022**	23-Jul-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-SUT) TBW44	**24-Jan-2022**	**31-Jan-2022**	23-Jul-2022	✓	**01-Feb-2022**	23-Jul-2022	✓
HDPE (no PTFE) (EP231X) QC1	**24-Jan-2022**	**31-Jan-2022**	23-Jul-2022	✓	**31-Jan-2022**	23-Jul-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-SUT) TBW44	**24-Jan-2022**	**31-Jan-2022**	23-Jul-2022	✓	**01-Feb-2022**	23-Jul-2022	✓
HDPE (no PTFE) (EP231X) QC1	**24-Jan-2022**	**31-Jan-2022**	23-Jul-2022	✓	**31-Jan-2022**	23-Jul-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) TBW44	**24-Jan-2022**	**31-Jan-2022**	23-Jul-2022	✓	**01-Feb-2022**	23-Jul-2022	✓
HDPE (no PTFE) (EP231X) QC1	**24-Jan-2022**	**31-Jan-2022**	23-Jul-2022	✓	**31-Jan-2022**	23-Jul-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-SUT)							
TBW44	**24-Jan-2022**	**31-Jan-2022**	23-Jul-2022	✓	**01-Feb-2022**	23-Jul-2022	✓
HDPE (no PTFE) (EP231X)							
QC1	**24-Jan-2022**	**31-Jan-2022**	23-Jul-2022	✓	**31-Jan-2022**	23-Jul-2022	✓
EP262: Ethanolamines							
Amber Glass Bottle - Unpreserved (EP262)							
QC1	**24-Jan-2022**	**----**	----	----	**31-Jan-2022**	31-Jan-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	2	50.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Ethanolamines by LCMSMS	EP262	1	2	50.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	2	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	17	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	1	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	8	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	2	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	1	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	1	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ethanolamines by LCMSMS	EP262	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ethanolamines by LCMSMS	EP262	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ethanolamines by LCMSMS	EP262	0	2	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	2	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	17	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	8	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	2	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines in Soils	EP262	SOIL	In House: 2g of soil is extracted into 10 mL of water then analysed by analysed by LC/MSMS in ESI Positive Mode.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is concentrated, combined with an equal volume of reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines by LCMSMS	EP262	WATER	In house: LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES — Mobile: 0407 817 762 — Email: bernie.weekes@coffey.com
Invoices to: COFFEY ACCOUNTS — Phone: — Email: @tetratech.com

Project No: 754-PERGN295751 — Task No: LAB
Project Name: PERDAMAN — Laboratory: ALS
Sampler's Name: NICK TAYLOR — Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	METALS S2	PFAS EP231X	MDEA EP262	EA037	HOLD	NOTES
1	SS23_0m	24/1/22	11:00am	SOIL	2J, 1P, 2Z	5 DAYS	X	X	X			PLEASE PROVIDE ASS RESULTS FOR REVIEW FOR FURTHER ANALYSIS (SPOCAS & CRS)
2	SS23_0.5m	↓	↓	↓	2J, 1P, 2Z	↓	X	X	X			
3	SS23_1.0m	↓	↓	↓	2J, 1P	↓					X	
4	AS58_0m									X		
5	AS58_0.25m									X		
6	AS58_0.5m									X		
7	AS58_0.75m									X		
8	AS58_1.0m									X		
9	AS58_1.25m									X		
10	AS58_1.5m									X		
11	AS58_1.75m									X		
12	AS58_2m									X		
13	AS58_2.25m									X		
14	AS58_2.5m									X		
15	AS58_2.75m									X		
16	AS58_3m									X		

EMAIL EA037 RESULTS TO BERNIE ASAP

Environmental Division Perth
Work Order Reference
EP2200878
Telephone : -- 61-8-9406 1301

RELINQUISHED BY		RECEIVED BY	
Name: NICK TAYLOR	Date: 25/1/22	Name: LOUFFY	Date: 27/1
Coffey	Time: 12:00pm	Company: ALS	Time: 1030
Name:	Date:	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)
- All Samples Recieved in Good Condition ☐
- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:

Report Results to: BERNIE WEEKES — Mobile: 0407 817 762 — Email: bernie.weeks@coffey.com ~~@tetratech.com~~

Invoices to: COFFEY ACCOUNTS — Phone: — Email: @tetratech.com

Project No: 754 _ PERFN295751 — Task No: LAB

Project Name: PERDAMAN — Laboratory: ALS

Sampler's Name: NICK TAYLOR — Project Manager: BERNIE WEEKES

Quote number (if different to current quoted prices):

Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS EP231X	MDEA EP262	~~[illegible]~~	W16T	W04									NOTES
17	QC1	24/1/22	12:30pm	WATER	1G,3P,2V	5 DAY	X	X		X										
18	QC2	24/1/22	12:30pm	WATER	1G,2V	5 DAY					X									PLEASE FILTER METALS.

RELINQUISHED BY

Name: NICK TAYLOR — Date: 25/1/22 → Coffey — Time: 12:00pm.

Name: — Date: → Company: — Time:

RECEIVED BY

Name: — Date: — Company: — Time:

Name: — Date: — Company: — Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐

All Documentation is in Proper Order ☐

Samples Received Properly Chilled ☐

Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201003**	Page	: 1 of 36
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 31-Jan-2022 11:45
Order number	: ----	Date Analysis Commenced	: 01-Feb-2022
C-O-C number	: ----	Issue Date	: 08-Feb-2022 10:34
Sampler	: CONNOR RICHARDS, Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 87		
No. of samples analysed	: 75		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Ethanolamines and PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP262: Poor matrix spike recovery for particular compounds due to matrix interferences.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EP075(SIM): Poor surrogate recoveries for EP2201003 due to suspected matrix effects and interferences.
- EP262: ALS is not NATA accredited for the analysis of MDEA.
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS24_0m	SS24_0.5m	ASS10_0m	ASS10_0.25m	ASS10_0.5m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-001	EP2201003-002	EP2201003-005	EP2201003-006	EP2201003-007
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	----	----	8.0	8.1	8.2
pH (Fox)	----	0.1	pH Unit	----	----	6.8	6.8	6.9
Reaction Rate	----	1	-	----	----	Moderate	Moderate	Moderate
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	14.8	15.1	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	8	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	18	16	----	----	----
Copper	7440-50-8	5	mg/kg	6	<5	----	----	----
Lead	7439-92-1	5	mg/kg	<5	<5	----	----	----
Nickel	7440-02-0	2	mg/kg	8	7	----	----	----
Zinc	7440-66-6	5	mg/kg	11	10	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS24_0m	SS24_0.5m	ASS10_0m	ASS10_0.25m	ASS10_0.5m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-001	EP2201003-002	EP2201003-005	EP2201003-006	EP2201003-007
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS24_0m	SS24_0.5m	ASS10_0m	ASS10_0.25m	ASS10_0.5m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-001	EP2201003-002	EP2201003-005	EP2201003-006	EP2201003-007
				Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	10	mg/kg	<10	<10	----	----	----
Diethanolamine	111-42-2	10	mg/kg	<10	<10	----	----	----
Methyl diethanolamine (MDEA)	105-59-9	10	mg/kg	<10	<10	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	104	104	----	----	----
13C8-PFOA	----	0.0002	%	108	98.0	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS10_0.75m	ASS10_1.0m	ASS10_1.25m	ASS10_1.5m	ASS10_1.75m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-008	EP2201003-009	EP2201003-010	EP2201003-011	EP2201003-012
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.6**	**8.6**	**8.8**	**8.6**	**9.0**
pH (Fox)	----	0.1	pH Unit	**6.7**	**6.7**	**6.8**	**6.8**	**6.8**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Moderate**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS10_2.0m	ASS10_2.25m	ASS10_2.5m	ASS10_2.75m	ASS10_3.0m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-013	EP2201003-014	EP2201003-015	EP2201003-016	EP2201003-017
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.8**	**8.8**	**8.8**	**8.7**	**8.6**
pH (Fox)	----	0.1	pH Unit	**6.8**	**6.8**	**6.9**	**6.8**	**6.8**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS9_0m	ASS9_0.25m	ASS9_0.5m	ASS9_0.75m	ASS9_1.0m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-018	EP2201003-019	EP2201003-020	EP2201003-021	EP2201003-022
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.4**	**8.4**	**8.8**	**9.1**	**9.2**
pH (Fox)	----	0.1	pH Unit	**7.2**	**7.4**	**6.8**	**6.9**	**6.9**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS9_1.25m	ASS9_1.5m	ASS9_1.75m	ASS9_2m	ASS9_2.25m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-023	EP2201003-024	EP2201003-025	EP2201003-026	EP2201003-027
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.9**	**8.8**	**8.8**	**8.8**	**8.8**
pH (Fox)	----	0.1	pH Unit	**6.8**	**6.6**	**6.6**	**6.7**	**6.7**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS9_2.5m	ASS9_2.75m	ASS9_3m	SS22_0m	SS22_1.0m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-028	EP2201003-029	EP2201003-030	EP2201003-031	EP2201003-033
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	8.7	8.6	8.8	----	----
pH (Fox)	----	0.1	pH Unit	6.7	6.8	6.8	----	----
Reaction Rate	----	1	-	Slight	Slight	Slight	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	----	----	----	8.3	10.7
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	----	----	9	<5
Cadmium	7440-43-9	1	mg/kg	----	----	----	<1	<1
Chromium	7440-47-3	2	mg/kg	----	----	----	18	18
Copper	7440-50-8	5	mg/kg	----	----	----	8	8
Lead	7439-92-1	5	mg/kg	----	----	----	<5	<5
Nickel	7440-02-0	2	mg/kg	----	----	----	8	14
Zinc	7440-66-6	5	mg/kg	----	----	----	12	35
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	----	<0.1	<0.1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	----	----	----	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	----	----	----	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS9_2.5m	ASS9_2.75m	ASS9_3m	SS22_0m	SS22_1.0m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-028	EP2201003-029	EP2201003-030	EP2201003-031	EP2201003-033
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
EP231P: PFAS Sums								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS9_2.5m	ASS9_2.75m	ASS9_3m	SS22_0m	SS22_1.0m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-028	EP2201003-029	EP2201003-030	EP2201003-031	EP2201003-033
				Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued								
Sum of PFAS	----	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
EP262: Ethanolamines								
Ethanolamine	141-43-5	10	mg/kg	----	----	----	<10	<10
Diethanolamine	111-42-2	10	mg/kg	----	----	----	<10	<10
Methyl diethanolamine (MDEA)	105-59-9	10	mg/kg	----	----	----	<10	<10
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	----	----	----	101	100
13C8-PFOA	----	0.0002	%	----	----	----	98.0	98.0

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS11_0m	ASS11_0.25m	ASS11_0.5m	ASS11_0.75m	ASS11_1.0m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-035	EP2201003-036	EP2201003-037	EP2201003-038	EP2201003-039
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.7**	**8.8**	**8.8**	**8.7**	**8.8**
pH (Fox)	----	0.1	pH Unit	**7.4**	**7.5**	**8.2**	**6.7**	**6.8**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Strong**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS12_0m	ASS12_0.25m	ASS12_0.5m	ASS12_0.75m	ASS12_1.0m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-040	EP2201003-041	EP2201003-042	EP2201003-043	EP2201003-044
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.3**	**8.2**	**8.2**	**8.3**	**8.6**
pH (Fox)	----	0.1	pH Unit	**7.5**	**6.9**	**6.9**	**6.7**	**7.3**
Reaction Rate	----	1	-	**Strong**	**Moderate**	**Moderate**	**Slight**	**Moderate**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS12_1.25m	ASS12_1.5m	ASS12_1.75m	ASS12_2m	ASS12_2.25m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-045	EP2201003-046	EP2201003-047	EP2201003-048	EP2201003-049
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.9**	**9.0**	**8.8**	**9.0**	**9.1**
pH (Fox)	----	0.1	pH Unit	**6.4**	**6.6**	**6.8**	**6.8**	**6.8**
Reaction Rate	----	1	-	**Moderate**	**Slight**	**Slight**	**Slight**	**Moderate**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS12_2.5m	ASS12_2.75m	ASS12_3m	SS25_0m	SS25_0.5m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-050	EP2201003-051	EP2201003-052	EP2201003-053	EP2201003-054
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	9.0	9.0	8.7	----	----
pH (Fox)	----	0.1	pH Unit	7.1	7.1	6.9	----	----
Reaction Rate	----	1	-	Moderate	Moderate	Slight	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	----	----	----	15.2	19.2
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	----	----	9	9
Cadmium	7440-43-9	1	mg/kg	----	----	----	<1	<1
Chromium	7440-47-3	2	mg/kg	----	----	----	16	23
Copper	7440-50-8	5	mg/kg	----	----	----	<5	6
Lead	7439-92-1	5	mg/kg	----	----	----	<5	<5
Nickel	7440-02-0	2	mg/kg	----	----	----	6	11
Zinc	7440-66-6	5	mg/kg	----	----	----	8	11
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	----	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	----	----	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	----	----	----	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	----	----	----	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	----	----	----	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	----	----	----	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	----	----	----	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	----	----	----	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	----	----	----	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	----	----	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	----	----	----	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	----	----	----	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	----	----	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	----	----	----	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	----	----	----	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	----	----	----	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	----	----	----	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	----	----	----	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS12_2.5m	ASS12_2.75m	ASS12_3m	SS25_0m	SS25_0.5m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-050	EP2201003-051	EP2201003-052	EP2201003-053	EP2201003-054
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	----	----	----	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	----	----	----	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	----	----	----	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	----	----	----	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	----	----	----	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	----	----	----	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	----	----	----	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	----	----	----	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	----	----	----	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	----	----	----	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	----	----	----	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	----	----	----	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	----	----	----	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	----	----	----	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	----	----	----	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	----	----	----	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	----	----	----	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	----	----	----	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	----	----	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	----	----	----	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	----	----	----	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	----	----	----	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	----	----	----	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	----	----	----	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	----	----	----	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	----	----	----	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	----	----	----	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	----	----	----	<0.05	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	----	----	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	----	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	----	----	----	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	----	----	----	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS12_2.5m	ASS12_2.75m	ASS12_3m	SS25_0m	SS25_0.5m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-050	EP2201003-051	EP2201003-052	EP2201003-053	EP2201003-054
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Phenanthrene	85-01-8	0.5	mg/kg	----	----	----	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	----	----	----	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	----	----	----	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	----	----	----	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	----	----	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	----	----	----	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	----	----	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	----	----	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	----	----	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	----	----	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	----	----	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	----	----	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	----	----	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	----	----	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	----	----	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	----	----	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	----	----	<10	<10
C10 - C14 Fraction	----	50	mg/kg	----	----	----	<50	<50
C15 - C28 Fraction	----	100	mg/kg	----	----	----	<100	<100
C29 - C36 Fraction	----	100	mg/kg	----	----	----	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	----	----	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	----	----	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	----	----	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	----	----	----	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	----	----	----	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	----	----	----	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	----	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	----	----	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	----	----	<0.2	<0.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS12_2.5m	ASS12_2.75m	ASS12_3m	SS25_0m	SS25_0.5m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-050	EP2201003-051	EP2201003-052	EP2201003-053	EP2201003-054
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
Toluene	108-88-3	0.5	mg/kg	----	----	----	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	----	----	----	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	----	----	----	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	----	----	----	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	----	----	----	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	----	----	----	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS12_2.5m	ASS12_2.75m	ASS12_3m	SS25_0m	SS25_0.5m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-050	EP2201003-051	EP2201003-052	EP2201003-053	EP2201003-054
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	----	----	----	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	----	----	----	<0.0002	<0.0002
EP262: Ethanolamines								
Ethanolamine	141-43-5	10	mg/kg	----	----	----	<10	<10
Diethanolamine	111-42-2	10	mg/kg	----	----	----	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS12_2.5m	ASS12_2.75m	ASS12_3m	SS25_0m	SS25_0.5m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-050	EP2201003-051	EP2201003-052	EP2201003-053	EP2201003-054
				Result	Result	Result	Result	Result
EP262: Ethanolamines - Continued								
Methyl diethanolamine (MDEA)	105-59-9	10	mg/kg	----	----	----	<10	<10
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	----	----	----	89.2	85.7
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	----	----	----	125	62.5
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	----	----	----	46.6	32.5
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	----	----	----	52.0	54.1
2-Chlorophenol-D4	93951-73-6	0.5	%	----	----	----	56.9	58.2
2.4.6-Tribromophenol	118-79-6	0.5	%	----	----	----	79.1	76.1
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	----	----	----	60.3	62.6
Anthracene-d10	1719-06-8	0.5	%	----	----	----	123	115
4-Terphenyl-d14	1718-51-0	0.5	%	----	----	----	76.3	73.0
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	----	----	95.9	100
Toluene-D8	2037-26-5	0.2	%	----	----	----	105	106
4-Bromofluorobenzene	460-00-4	0.2	%	----	----	----	105	103
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	----	----	----	102	97.5
13C8-PFOA	----	0.0002	%	----	----	----	101	99.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS18_0m	ASS18_0.25m	ASS18_0.5m	ASS18_0.75m	SS21_1.0m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-057	EP2201003-058	EP2201003-059	EP2201003-060	EP2201003-061
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.8**	**8.1**	**8.2**	**8.2**	**8.4**
pH (Fox)	----	0.1	pH Unit	**7.3**	**7.6**	**6.9**	**6.8**	**6.7**
Reaction Rate	----	1	-	**Moderate**	**Strong**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS18_1.25m	ASS18_1.5m	ASS18_1.75m	ASS18_2m	ASS18_2.25m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-062	EP2201003-063	EP2201003-064	EP2201003-065	EP2201003-066
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.4**	**8.5**	**8.6**	**8.5**	**8.4**
pH (Fox)	----	0.1	pH Unit	**6.7**	**6.7**	**6.8**	**6.8**	**6.9**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS18_2.5m	ASS14_0m	ASS14_0.25m	ASS14_0.5m	ASS14_0.75m
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-067	EP2201003-068	EP2201003-069	EP2201003-070	EP2201003-071
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.4**	**8.2**	**8.2**	**8.3**	**8.8**
pH (Fox)	----	0.1	pH Unit	**6.7**	**7.1**	**6.9**	**7.1**	**7.3**
Reaction Rate	----	1	-	**Slight**	**Strong**	**Strong**	**Moderate**	**Moderate**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS26_0m	SS26_0.5m	SS21_0m	SS21_0.5m	QC3
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-072	EP2201003-073	EP2201003-075	EP2201003-076	EP2201003-079
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	18.2	10.2	21.2	15.4	11.0
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	9	<5	17	<5	11
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	19	21	25	24	23
Copper	7440-50-8	5	mg/kg	<5	6	6	5	6
Lead	7439-92-1	5	mg/kg	<5	<5	<5	<5	<5
Nickel	7440-02-0	2	mg/kg	8	11	10	10	11
Zinc	7440-66-6	5	mg/kg	9	16	11	10	19
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS26_0m	SS26_0.5m	SS21_0m	SS21_0.5m	QC3
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-072	EP2201003-073	EP2201003-075	EP2201003-076	EP2201003-079
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS26_0m	SS26_0.5m	SS21_0m	SS21_0.5m	QC3
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-072	EP2201003-073	EP2201003-075	EP2201003-076	EP2201003-079
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**1.2**	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	----
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	----
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	----
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	----
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS26_0m	SS26_0.5m	SS21_0m	SS21_0.5m	QC3
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-072	EP2201003-073	EP2201003-075	EP2201003-076	EP2201003-079
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	**0.0003**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	**0.0002**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS26_0m	SS26_0.5m	SS21_0m	SS21_0.5m	QC3
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-072	EP2201003-073	EP2201003-075	EP2201003-076	EP2201003-079
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	**0.0005**	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0005**	<0.0002	<0.0002	<0.0002	<0.0002
EP262: Ethanolamines								
Ethanolamine	141-43-5	10	mg/kg	<10	<10	<10	<10	----
Diethanolamine	111-42-2	10	mg/kg	<10	<10	<10	<10	----
Methyl diethanolamine (MDEA)	105-59-9	10	mg/kg	<10	<10	<10	<10	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**94.2**	**71.4**	**111**	**114**	----
EP068S: Organochlorine Pesticide Surrogate								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS26_0m	SS26_0.5m	SS21_0m	SS21_0.5m	QC3
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201003-072	EP2201003-073	EP2201003-075	EP2201003-076	EP2201003-079
				Result	Result	Result	Result	Result
EP068S: Organochlorine Pesticide Surrogate - Continued								
Dibromo-DDE	21655-73-2	0.05	%	119	116	75.9	104	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	41.3	52.6	112	77.9	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	44.9	51.3	54.1	58.4	----
2-Chlorophenol-D4	93951-73-6	0.5	%	52.7	55.0	58.3	64.0	----
2.4.6-Tribromophenol	118-79-6	0.5	%	29.0	42.0	27.3	46.0	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	56.5	59.2	62.3	63.7	----
Anthracene-d10	1719-06-8	0.5	%	79.6	42.6	50.0	108	----
4-Terphenyl-d14	1718-51-0	0.5	%	76.7	74.6	73.8	58.1	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	102	104	93.0	93.7	----
Toluene-D8	2037-26-5	0.2	%	107	112	102	105	----
4-Bromofluorobenzene	460-00-4	0.2	%	104	107	97.6	100	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	95.0	112	102	106	102
13C8-PFOA	----	0.0002	%	95.0	102	94.5	93.0	102

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC5	QC7	QC9	----	----
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	25-Jan-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2201003-080	EP2201003-082	EP2201003-084	--------	--------
				Result	Result	Result	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**9.0**	**7.7**	**7.9**	**----**	**----**
pH (Fox)	----	0.1	pH Unit	**8.3**	**6.5**	**7.1**	**----**	**----**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Moderate**	**----**	**----**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC11	QC12	----	----	----
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201003-086	EP2201003-087	--------	--------	--------
				Result	Result	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	----	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	----	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	----	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	----	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	----	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	----	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	----	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L	----	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L	----	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L	----	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	----	<100	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	----	<100	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	----	<1	----	----	----
Toluene	108-88-3	2	µg/L	----	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	----	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	----	<2	----	----	----
^ Total Xylenes	----	2	µg/L	----	<2	----	----	----
^ Sum of BTEX	----	1	µg/L	----	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	----	<5	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC11	QC12	----	----	----
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201003-086	EP2201003-087	--------	--------	--------
				Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC11	QC12	----	----	----
			Sampling date / time	25-Jan-2022 00:00	25-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201003-086	EP2201003-087	--------	--------	--------
				Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<1	----	----	----	----
Diethanolamine	111-42-2	1	µg/L	<1	----	----	----	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	----	89.4	----	----	----
Toluene-D8	2037-26-5	2	%	----	102	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	----	95.1	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	103	----	----	----	----
13C8-PFOA	----	0.02	%	104	----	----	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	43	119
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	53	152
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	28	152
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	57	119
2-Chlorophenol-D4	93951-73-6	52	130
2.4.6-Tribromophenol	118-79-6	40	132
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	53	139
Anthracene-d10	1719-06-8	68	124
4-Terphenyl-d14	1718-51-0	66	132
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	63	132
Toluene-D8	2037-26-5	66	125
4-Bromofluorobenzene	460-00-4	60	124
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP262: Ethanolamines

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231S: PFAS Surrogate

(WATER) EP262: Ethanolamines

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology). Only applies to samples EP2201003 (079).

(SOIL) EG005(ED093)T: Total Metals by ICP-AES

(SOIL) EG035T: Total Recoverable Mercury by FIMS

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2201003**	Page	: 1 of 14
Amendment	: **(Preliminary Report)**		
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 31-Jan-2022
Order number	: ----	Date Analysis Commenced	: 01-Feb-2022
C-O-C number	: ----	Issue Date	: 02-Feb-2022
Sampler	: CONNOR RICHARDS, Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 87		
No. of samples analysed	: 75		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
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General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4148593)									
EP2201003-079	QC3	EG005T: Cadmium	7440-43-9	1	mg/kg	----	----	----	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	----	----	----	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	----	----	----	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	----	----	----	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	----	----	----	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	----	----	----	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	----	----	----	No Limit
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4149642)									
EP2200471-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	----	----	----	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	----	----	----	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	----	----	----	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	----	----	----	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	----	----	----	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	----	----	----	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	----	----	----	No Limit
EP2201003-072	SS26_0m	EG005T: Cadmium	7440-43-9	1	mg/kg	----	----	----	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	----	----	----	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	----	----	----	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	----	----	----	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	----	----	----	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	----	----	----	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	----	----	----	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 4150911)									
EP2201003-005	ASS10_0m	EA037: pH (F)	----	0.1	pH Unit	8.0	8.2	1.7	0% - 20%

(Preliminary Report)

Work Order : EP2201003
Client : Tetra Tech Coffey Pty Ltd
Project : 754-PEREN295751 Perdaman

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA037: Ass Field Screening Analysis (QC Lot: 4150911) - continued									
EP2201003-005	ASS10_0m	EA037: pH (Fox)	----	0.1	pH Unit	6.8	6.8	0.0	0% - 20%
EP2201003-014	ASS10_2.25m	EA037: pH (F)	----	0.1	pH Unit	8.8	8.8	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.8	6.8	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 4150912)									
EP2201003-025	ASS9_1.75m	EA037: pH (F)	----	0.1	pH Unit	8.8	8.8	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.6	6.6	0.0	0% - 20%
EP2201003-038	ASS11_0.75m	EA037: pH (F)	----	0.1	pH Unit	8.7	8.8	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.7	6.7	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 4150913)									
EP2201003-049	ASS12_2.25m	EA037: pH (F)	----	0.1	pH Unit	9.1	9.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.8	6.8	0.0	0% - 20%
EP2201003-062	ASS18_1.25m	EA037: pH (F)	----	0.1	pH Unit	8.4	8.4	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.7	6.8	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 4150914)									
EP2201003-082	QC7	EA037: pH (F)	----	0.1	pH Unit	7.7	7.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.5	6.5	0.0	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4148604)									
ES2202455-042	Anonymous	EA055: Moisture Content	----	0.1	%	25.0	24.1	3.9	0% - 20%
ES2203013-003	Anonymous	EA055: Moisture Content	----	0.1	%	20.4	20.6	0.9	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4149641)									
EP2200980-001	Anonymous	EA055: Moisture Content	----	0.1	%	----	----	----	No Limit
EP2200980-010	Anonymous	EA055: Moisture Content	----	0.1	%	----	----	----	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4148592)									
EP2201003-079	QC3	EG035T: Mercury	7439-97-6	0.1	mg/kg	----	----	----	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4149643)									
EP2200471-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	----	----	----	No Limit
EP2201003-072	SS26_0m	EG035T: Mercury	7439-97-6	0.1	mg/kg	----	----	----	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4147679)									
EP2201003-053	SS25_0m	EP080: C6 - C9 Fraction	----	10	mg/kg	----	----	----	No Limit
EP2201008-049	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	----	----	----	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4147679)									
EP2201003-053	SS25_0m	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	----	----	----	No Limit
EP2201008-049	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	----	----	----	No Limit
EP080: BTEXN (QC Lot: 4147679)									
EP2201003-053	SS25_0m	EP080: Benzene	71-43-2	0.2	mg/kg	----	----	----	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	----	----	----	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	No Limit

(Preliminary Report)

Work Order : EP2201003
Client : Tetra Tech Coffey Pty Ltd
Project : 754-PEREN295751 Perdaman

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP080: BTEXN (QC Lot: 4147679) - continued									
EP2201003-053	SS25_0m	EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	----	----	----	No Limit
EP2201008-049	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	----	----	----	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	----	----	----	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	----	----	----	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4148566)									
EP2200984-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	----	----	----	No Limit
EP2201003-031	SS22_0m	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	----	----	----	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4148566)									
EP2200984-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	----	----	----	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	----	----	----	No Limit
EP2201003-031	SS22_0m	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	----	----	----	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4148566) - continued									
EP2201003-031	SS22_0m	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	----	----	----	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	----	----	----	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	----	----	----	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4148566)									
EP2200984-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	----	----	----	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	----	----	----	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	----	----	----	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	----	----	----	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	----	----	----	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	----	----	----	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	----	----	----	No Limit
EP2201003-031	SS22_0m	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	----	----	----	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	----	----	----	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	----	----	----	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	----	----	----	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	----	----	----	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	----	----	----	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	----	----	----	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4148566)									
EP2200984-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	----	----	----	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	----	----	----	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	----	----	----	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4148566) - continued									
EP2200984-001	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	----	----	----	No Limit
EP2201003-031	SS22_0m	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	----	----	----	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	----	----	----	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	----	----	----	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	----	----	----	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4147762)									
EP2200943-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0176	0.0161	9.1	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.020	<0.020	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.035	0.037	4.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.362	0.344	5.2	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.370	0.347	6.5	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	4.16	4.04	3.0	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.100	<0.100	0.0	No Limit
EP2201020-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 4147763)									
EP2200943-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0005	<0.0005	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4147727)									
EP2201003-087	QC12	EP080: C6 - C9 Fraction	----	20	µg/L	----	----	----	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4147727)									
EP2201003-087	QC12	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	----	----	----	No Limit
EP080: BTEXN (QC Lot: 4147727)									
EP2201003-087	QC12	EP080: Benzene	71-43-2	1	µg/L	----	----	----	No Limit
		EP080: Toluene	108-88-3	2	µg/L	----	----	----	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	----	----	----	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	----	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080: BTEXN (QC Lot: 4147727) - continued									
EP2201003-087	QC12	EP080: ortho-Xylene	95-47-6	2	µg/L	----	----	----	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	----	----	----	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4148906)									
EP2200902-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	----	----	----	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	----	----	----	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	----	----	----	No Limit
ES2203274-002	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	----	----	----	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	----	----	----	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	----	----	----	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4148906)									
EP2200902-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	----	----	----	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	----	----	----	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	----	----	----	No Limit
ES2203274-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	----	----	----	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	----	----	----	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	----	----	----	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	----	----	----	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4148906)									
EP2200902-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	----	----	----	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4148906) - continued									
EP2200902-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	----	----	----	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	----	----	----	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	----	----	----	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	----	----	----	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	----	----	----	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	----	----	----	No Limit
ES2203274-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	----	----	----	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	----	----	----	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	----	----	----	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	----	----	----	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	----	----	----	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	----	----	----	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	----	----	----	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4148906)									
EP2200902-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	----	----	----	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	----	----	----	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	----	----	----	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	----	----	----	No Limit
ES2203274-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	----	----	----	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	----	----	----	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	----	----	----	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4148906) - continued									
ES2203274-002	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	----	----	----	No Limit
EP231P: PFAS Sums (QC Lot: 4148906)									
EP2200902-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	----	----	----	No Limit
ES2203274-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	----	----	----	No Limit
EP262: Ethanolamines (QC Lot: 4149135)									
EP2201003-086	QC11	EP262: Ethanolamine	141-43-5	1	µg/L	----	----	----	No Limit
		EP262: Diethanolamine	111-42-2	1	µg/L	----	----	----	No Limit
		EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	----	----	----	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4147762)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	105	84.0	120
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	103	86.0	120
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.2	85.0	120
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	84.0	120
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	85.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	84.0	120
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	107	89.0	120
EG035F: Dissolved Mercury by FIMS (QCLot: 4147763)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	Not Authorised	----	# Not Authorised	92.0	116

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4148593)							
EP2201003-079	QC3	EG005T: Arsenic	7440-38-2	----		70.0	130
		EG005T: Cadmium	7440-43-9	----		70.0	130
		EG005T: Chromium	7440-47-3	----		68.0	132
		EG005T: Copper	7440-50-8	----		70.0	130
		EG005T: Lead	7439-92-1	----		70.0	130
		EG005T: Nickel	7440-02-0	----		70.0	130
		EG005T: Zinc	7440-66-6	----		66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4149642)							
EP2200471-001	Anonymous	EG005T: Arsenic	7440-38-2	----		70.0	130
		EG005T: Cadmium	7440-43-9	----		70.0	130
		EG005T: Chromium	7440-47-3	----		70.0	130
		EG005T: Copper	7440-50-8	----		70.0	130
		EG005T: Lead	7439-92-1	----		70.0	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4149642) - continued							
EP2200471-001	Anonymous	EG005T: Nickel	7440-02-0	----		70.0	130
		EG005T: Zinc	7440-66-6	----		70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4148592)							
EP2201003-079	QC3	EG035T: Mercury	7439-97-6	----		70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4149643)							
EP2200471-001	Anonymous	EG035T: Mercury	7439-97-6	----		70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4147679)							
EP2201003-054	SS25_0.5m	EP080: C6 - C9 Fraction	----	----		69.1	135
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4147679)							
EP2201003-054	SS25_0.5m	EP080: C6 - C10 Fraction	C6_C10	----		69.1	135
EP080: BTEXN (QCLot: 4147679)							
EP2201003-054	SS25_0.5m	EP080: Benzene	71-43-2	----		76.4	118
		EP080: Toluene	108-88-3	----		67.4	112
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4148566)							
EP2200984-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	----		72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	----		73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	----		67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	----		70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	----		68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	----		59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4148566)							
EP2200984-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	----		71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	----		69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	----		70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	----		71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	----		69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	----		72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	----		69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	----		64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	----		69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	----		66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	----		69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4148566)							
EP2200984-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	----		67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	----		71.6	129

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4148566) - continued							
EP2200984-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	----		69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	----		68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	----		65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	----		63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	----		61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4148566)							
EP2200984-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	----		62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	----		64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	----		65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	----		69.2	143

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4147762)							
EP2200943-003	Anonymous	EG020A-F: Arsenic	7440-38-2	10 mg/L	111	70.0	130
		EG020A-F: Cadmium	7440-43-9	2.5 mg/L	101	70.0	130
		EG020A-F: Chromium	7440-47-3	10 mg/L	94.9	70.0	130
		EG020A-F: Copper	7440-50-8	10 mg/L	104	70.0	130
		EG020A-F: Lead	7439-92-1	10 mg/L	95.3	70.0	130
		EG020A-F: Nickel	7440-02-0	10 mg/L	105	70.0	130
		EG020A-F: Zinc	7440-66-6	10 mg/L	108	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4147763)							
EP2200943-004	Anonymous	EG035F: Mercury	7439-97-6	----	# Not Authorised	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4147727)							
EP2201008-052	Anonymous	EP080: C6 - C9 Fraction	----	----		77.0	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4147727)							
EP2201008-052	Anonymous	EP080: C6 - C10 Fraction	C6_C10	----		77.0	137
EP080: BTEXN (QCLot: 4147727)							
EP2201008-052	Anonymous	EP080: Benzene	71-43-2	----		77.0	122
		EP080: Toluene	108-88-3	----		73.5	126
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4148906)							
ES2203274-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	----		72.0	130

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4148906) - continued							
ES2203274-001	Anonymous	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	----		71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	----		68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	----		69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	----		65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	----		53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4148906)							
ES2203274-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	----		73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	----		72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	----		72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	----		72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	----		71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	----		69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	----		71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	----		69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	----		72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	----		65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	----		71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4148906)							
ES2203274-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	----		67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	----		68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	----		62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	----		66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	----		57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	----		65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	----		61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4148906)							
ES2203274-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	----		63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	----		64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	----		67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	----		71.4	144
EP262: Ethanolamines (QCLot: 4149135)							
EP2201003-086	QC11	EP262: Ethanolamine	141-43-5	----		50.0	130
		EP262: Diethanolamine	111-42-2	----		50.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP262: Ethanolamines (QCLot: 4149135) - continued							
EP2201003-086	QC11	EP262: Methyl diethanolamine (MDEA)	105-59-9	----		50.0	130

- **No Matrix Spike (MS) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201003**	Page	: 1 of 12
Amendment	: **(Preliminary Report)**		
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 31-Jan-2022
Site	: ----	Issue Date	: 02-Feb-2022
Sampler	: CONNOR RICHARDS, Nick Taylor	No. of samples received	: 87
Order number	: ----	No. of samples analysed	: 75

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EP262: Ethanolamines						
Amber Bottle Unpreserved for Specialist Organics						
QC11	----	----	----	NAU	01-Feb-2022	**1**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EA037: Ass Field Screening Analysis							
Snap Lock Bag - frozen (EA037)							

(Preliminary Report)

Work Order : EP2201003
Client : Tetra Tech Coffey Pty Ltd
Project : 754-PEREN295751 Perdaman

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis - Continued								
ASS10_0m,	ASS10_0.25m,	**25-Jan-2022**	**02-Feb-2022**	24-Jul-2022	✓	**02-Feb-2022**	24-Jul-2022	✓
ASS10_0.5m,	ASS10_0.75m,							
ASS10_1.0m,	ASS10_1.25m,							
ASS10_1.5m,	ASS10_1.75m,							
ASS10_2.0m,	ASS10_2.25m,							
ASS10_2.5m,	ASS10_2.75m,							
ASS10_3.0m,	ASS9_0m,							
ASS9_0.25m,	ASS9_0.5m,							
ASS9_0.75m,	ASS9_1.0m,							
ASS9_1.25m,	ASS9_1.5m,							
ASS9_1.75m,	ASS9_2m,							
ASS9_2.25m,	ASS9_2.5m,							
ASS9_2.75m,	ASS9_3m,							
ASS11_0m,	ASS11_0.25m,							
ASS11_0.5m,	ASS11_0.75m,							
ASS11_1.0m,	ASS12_0m,							
ASS12_0.25m,	ASS12_0.5m,							
ASS12_0.75m,	ASS12_1.0m,							
ASS12_1.25m,	ASS12_1.5m,							
ASS12_1.75m,	ASS12_2m,							
ASS12_2.25m,	ASS12_2.5m,							
QC5,								
ASS12_2.75m,	ASS12_3m,							
ASS18_0m,	ASS18_0.25m,							
ASS18_0.5m,	ASS18_0.75m,							
SS21_1.0m,	ASS18_1.25m,							
ASS18_1.5m,	ASS18_1.75m,							
ASS18_2m,	ASS18_2.25m,							
ASS18_2.5m,	ASS14_0m,							
ASS14_0.25m,	ASS14_0.5m,							
ASS14_0.75m,	QC7, QC9							
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055)								
QC3		**25-Jan-2022**	**----**	----	----	**Not Authorised**	08-Feb-2022	✓
Soil Glass Jar - Unpreserved (EA055)								
SS24_0m,	SS24_0.5m,	**25-Jan-2022**	**----**	----	----	**Not Authorised**	08-Feb-2022	✓
SS22_0m,	SS22_1.0m,							
SS25_0m,	SS25_0.5m,							
SS26_0m,	SS26_0.5m,							
SS21_0m,	SS21_0.5m							

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Work Order : EP2201003
Client : Tetra Tech Coffey Pty Ltd
Project : 754-PEREN295751 Perdaman

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005(ED093)T: Total Metals by ICP-AES								
HDPE Soil Jar (EG005T)								
QC3		**25-Jan-2022**	**01-Feb-2022**	24-Jul-2022	✓	**Not Authorised**	24-Jul-2022	✓
Soil Glass Jar - Unpreserved (EG005T)								
SS24_0m,	SS24_0.5m,	**25-Jan-2022**	**02-Feb-2022**	24-Jul-2022	✓	**Not Authorised**	24-Jul-2022	✓
SS22_0m,	SS22_1.0m,							
SS25_0m,	SS25_0.5m,							
SS26_0m,	SS26_0.5m,							
SS21_0m,	SS21_0.5m							
EG035T: Total Recoverable Mercury by FIMS								
HDPE Soil Jar (EG035T)								
QC3		**25-Jan-2022**	**01-Feb-2022**	22-Feb-2022	✓	**Not Authorised**	22-Feb-2022	✓
Soil Glass Jar - Unpreserved (EG035T)								
SS24_0m,	SS24_0.5m,	**25-Jan-2022**	**02-Feb-2022**	22-Feb-2022	✓	**Not Authorised**	22-Feb-2022	✓
SS22_0m,	SS22_1.0m,							
SS25_0m,	SS25_0.5m,							
SS26_0m,	SS26_0.5m,							
SS21_0m,	SS21_0.5m							
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066)								
SS25_0m,	SS25_0.5m,	**25-Jan-2022**	**01-Feb-2022**	08-Feb-2022	✓	**Not Authorised**	13-Mar-2022	----
SS26_0m,	SS26_0.5m,							
SS21_0m,	SS21_0.5m							
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
SS25_0m,	SS25_0.5m,	**25-Jan-2022**	**01-Feb-2022**	08-Feb-2022	✓	**Not Authorised**	13-Mar-2022	----
SS26_0m,	SS26_0.5m,							
SS21_0m,	SS21_0.5m							
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068)								
SS25_0m,	SS25_0.5m,	**25-Jan-2022**	**01-Feb-2022**	08-Feb-2022	✓	**Not Authorised**	13-Mar-2022	----
SS26_0m,	SS26_0.5m,							
SS21_0m,	SS21_0.5m							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
SS25_0m,	SS25_0.5m,	**25-Jan-2022**	**01-Feb-2022**	08-Feb-2022	✓	**Not Authorised**	13-Mar-2022	----
SS26_0m,	SS26_0.5m,							
SS21_0m,	SS21_0.5m							

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Project : 754-PEREN295751 Perdaman

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP071)								
SS25_0m,	SS25_0.5m,	**25-Jan-2022**	**01-Feb-2022**	08-Feb-2022	✓	**Not Authorised**	13-Mar-2022	----
SS26_0m,	SS26_0.5m,							
SS21_0m,	SS21_0.5m							
Soil Glass Jar - Unpreserved (EP080)								
SS25_0m,	SS25_0.5m,	**25-Jan-2022**	**02-Feb-2022**	08-Feb-2022	✓	**Not Authorised**	08-Feb-2022	✓
SS26_0m,	SS26_0.5m,							
SS21_0m,	SS21_0.5m							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP071)								
SS25_0m,	SS25_0.5m,	**25-Jan-2022**	**01-Feb-2022**	08-Feb-2022	✓	**Not Authorised**	13-Mar-2022	----
SS26_0m,	SS26_0.5m,							
SS21_0m,	SS21_0.5m							
Soil Glass Jar - Unpreserved (EP080)								
SS25_0m,	SS25_0.5m,	**25-Jan-2022**	**02-Feb-2022**	08-Feb-2022	✓	**Not Authorised**	08-Feb-2022	✓
SS26_0m,	SS26_0.5m,							
SS21_0m,	SS21_0.5m							
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
SS25_0m,	SS25_0.5m,	**25-Jan-2022**	**02-Feb-2022**	08-Feb-2022	✓	**Not Authorised**	08-Feb-2022	✓
SS26_0m,	SS26_0.5m,							
SS21_0m,	SS21_0.5m							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
SS24_0m,	SS24_0.5m,	**25-Jan-2022**	**02-Feb-2022**	24-Jul-2022	✓	**Not Authorised**	14-Mar-2022	✓
SS22_0m,	SS22_1.0m,							
SS25_0m,	SS25_0.5m,							
SS26_0m,	SS26_0.5m,							
SS21_0m,	SS21_0.5m,							
QC3								
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X)								
SS24_0m,	SS24_0.5m,	**25-Jan-2022**	**02-Feb-2022**	24-Jul-2022	✓	**Not Authorised**	14-Mar-2022	✓
SS22_0m,	SS22_1.0m,							
SS25_0m,	SS25_0.5m,							
SS26_0m,	SS26_0.5m,							
SS21_0m,	SS21_0.5m,							
QC3								

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Client : Tetra Tech Coffey Pty Ltd
Project : 754-PEREN295751 Perdaman

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) SS24_0m, SS24_0.5m, SS22_0m, SS22_1.0m, SS25_0m, SS25_0.5m, SS26_0m, SS26_0.5m, SS21_0m, SS21_0.5m, QC3	**25-Jan-2022**	**02-Feb-2022**	24-Jul-2022	✓	**Not Authorised**	14-Mar-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) SS24_0m, SS24_0.5m, SS22_0m, SS22_1.0m, SS25_0m, SS25_0.5m, SS26_0m, SS26_0.5m, SS21_0m, SS21_0.5m, QC3	**25-Jan-2022**	**02-Feb-2022**	24-Jul-2022	✓	**Not Authorised**	14-Mar-2022	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) SS24_0m, SS24_0.5m, SS22_0m, SS22_1.0m, SS25_0m, SS25_0.5m, SS26_0m, SS26_0.5m, SS21_0m, SS21_0.5m, QC3	**25-Jan-2022**	**02-Feb-2022**	24-Jul-2022	✓	**Not Authorised**	14-Mar-2022	✓
EP262: Ethanolamines							
Soil Glass Jar - Unpreserved (EP262) SS24_0m, SS24_0.5m, SS22_0m, SS22_1.0m, SS25_0m, SS25_0.5m, SS26_0m, SS26_0.5m, SS21_0m, SS21_0.5m	**25-Jan-2022**	**----**	----	----	**Not Authorised**	08-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F) QC11	**25-Jan-2022**	**----**	----	----	**Not Authorised**	24-Jul-2022	✓
EG035F: Dissolved Mercury by FIMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG035F) QC11	**25-Jan-2022**	**----**	----	----	**Not Authorised**	22-Feb-2022	✓

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Project : 754-PEREN295751 Perdaman

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
QC12	25-Jan-2022	01-Feb-2022	01-Feb-2022	✓	Not Authorised	13-Mar-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
QC12	25-Jan-2022	02-Feb-2022	08-Feb-2022	✓	Not Authorised	08-Feb-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
QC12	25-Jan-2022	01-Feb-2022	01-Feb-2022	✓	Not Authorised	13-Mar-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
QC12	25-Jan-2022	02-Feb-2022	08-Feb-2022	✓	Not Authorised	08-Feb-2022	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
QC12	25-Jan-2022	02-Feb-2022	08-Feb-2022	✓	Not Authorised	08-Feb-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
QC11	25-Jan-2022	02-Feb-2022	24-Jul-2022	✓	Not Authorised	24-Jul-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
QC11	25-Jan-2022	02-Feb-2022	24-Jul-2022	✓	Not Authorised	24-Jul-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
QC11	25-Jan-2022	02-Feb-2022	24-Jul-2022	✓	Not Authorised	24-Jul-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
QC11	25-Jan-2022	02-Feb-2022	24-Jul-2022	✓	Not Authorised	24-Jul-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
QC11	25-Jan-2022	02-Feb-2022	24-Jul-2022	✓	Not Authorised	24-Jul-2022	✓
EP262: Ethanolamines							
Amber Bottle Unpreserved for Specialist Organics (EP262)							
QC11	25-Jan-2022	----	----	----	Not Authorised	01-Feb-2022	×

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	7	62	11.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	6	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	1	6	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	1	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

(Preliminary Report)

Work Order : EP2201003
Client : Tetra Tech Coffey Pty Ltd
Project : 754-PEREN295751 Perdaman

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines in Soils	EP262	SOIL	In House: 2g of soil is extracted into 10 mL of water then analysed by analysed by LC/MSMS in ESI Positive Mode.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines by LCMSMS	EP262	WATER	In house: LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2201003**

Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: bernie.weekes@coffey.com	E-mail	: Lauren.biagioni@alsglobal.com
Telephone	: ----	Telephone	: 08 9406 1307
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: 754-PEREN295751 Perdaman	Page	: 1 of 5
Order number	: ----	Quote number	: EP2021COFENVWA0038_V3 (EP/1105/21_V3)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: CONNOR RICHARDS, Nick Taylor		

Dates

Date Samples Received	: 31-Jan-2022 11:45	Issue Date	: 01-Feb-2022
Client Requested Due Date	: 07-Feb-2022	Scheduled Reporting Date	: **03-Feb-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 18.8 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 87 / 75

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Ethanolamines and PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Ethanolamines and PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	(On Hold) SOIL No analysis requested	SOIL - EA037 ASS Field Screening Analysis	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)	SOIL - EP262 Ethanolamines in Soils	SOIL - S-02 8 Metals (incl. Digestion)	SOIL - S-13 OC/OP/PCB
EP2201003-001	25-Jan-2022 00:00	SS24_0m			✓	✓	✓	✓	
EP2201003-002	25-Jan-2022 00:00	SS24_0.5m			✓	✓	✓	✓	
EP2201003-003	25-Jan-2022 00:00	SS24_1.0m	✓						
EP2201003-004	25-Jan-2022 00:00	SS24_2.0m	✓						
EP2201003-005	25-Jan-2022 00:00	ASS10_0m		✓					
EP2201003-006	25-Jan-2022 00:00	ASS10_0.25m		✓					
EP2201003-007	25-Jan-2022 00:00	ASS10_0.5m		✓					
EP2201003-008	25-Jan-2022 00:00	ASS10_0.75m		✓					
EP2201003-009	25-Jan-2022 00:00	ASS10_1.0m		✓					
EP2201003-010	25-Jan-2022 00:00	ASS10_1.25m		✓					
EP2201003-011	25-Jan-2022 00:00	ASS10_1.5m		✓					
EP2201003-012	25-Jan-2022 00:00	ASS10_1.75m		✓					
EP2201003-013	25-Jan-2022 00:00	ASS10_2.0m		✓					
EP2201003-014	25-Jan-2022 00:00	ASS10_2.25m		✓					
EP2201003-015	25-Jan-2022 00:00	ASS10_2.5m		✓					
EP2201003-016	25-Jan-2022 00:00	ASS10_2.75m		✓					
EP2201003-017	25-Jan-2022 00:00	ASS10_3.0m		✓					
EP2201003-018	25-Jan-2022 00:00	ASS9_0m		✓					
EP2201003-019	25-Jan-2022 00:00	ASS9_0.25m		✓					
EP2201003-020	25-Jan-2022 00:00	ASS9_0.5m		✓					
EP2201003-021	25-Jan-2022 00:00	ASS9_0.75m		✓					
EP2201003-022	25-Jan-2022 00:00	ASS9_1.0m		✓					
EP2201003-023	25-Jan-2022 00:00	ASS9_1.25m		✓					
EP2201003-024	25-Jan-2022 00:00	ASS9_1.5m		✓					
EP2201003-025	25-Jan-2022 00:00	ASS9_1.75m		✓					
EP2201003-026	25-Jan-2022 00:00	ASS9_2m		✓					
EP2201003-027	25-Jan-2022 00:00	ASS9_2.25m		✓					
EP2201003-028	25-Jan-2022 00:00	ASS9_2.5m		✓					
EP2201003-029	25-Jan-2022 00:00	ASS9_2.75m		✓					
EP2201003-030	25-Jan-2022 00:00	ASS9_3m		✓					
EP2201003-031	25-Jan-2022 00:00	SS22_0m			✓	✓	✓	✓	
EP2201003-032	25-Jan-2022 00:00	SS22_0.5m	✓						
EP2201003-033	25-Jan-2022 00:00	SS22_1.0m			✓	✓	✓	✓	
EP2201003-034	25-Jan-2022 00:00	SS22_2.0m	✓						
EP2201003-035	25-Jan-2022 00:00	ASS11_0m		✓					

			(On Hold) SOIL No analysis requested	SOIL - EA037 ASS Field Screening Analysis	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)	SOIL - EP262 Ethanolamines in Soils	SOIL - S-02 8 Metals (incl. Digestion)	SOIL - S-13 OC/OP/PCB
EP2201003-036	25-Jan-2022 00:00	ASS11_0.25m		✓					
EP2201003-037	25-Jan-2022 00:00	ASS11_0.5m		✓					
EP2201003-038	25-Jan-2022 00:00	ASS11_0.75m		✓					
EP2201003-039	25-Jan-2022 00:00	ASS11_1.0m		✓					
EP2201003-040	25-Jan-2022 00:00	ASS12_0m		✓					
EP2201003-041	25-Jan-2022 00:00	ASS12_0.25m		✓					
EP2201003-042	25-Jan-2022 00:00	ASS12_0.5m		✓					
EP2201003-043	25-Jan-2022 00:00	ASS12_0.75m		✓					
EP2201003-044	25-Jan-2022 00:00	ASS12_1.0m		✓					
EP2201003-045	25-Jan-2022 00:00	ASS12_1.25m		✓					
EP2201003-046	25-Jan-2022 00:00	ASS12_1.5m		✓					
EP2201003-047	25-Jan-2022 00:00	ASS12_1.75m		✓					
EP2201003-048	25-Jan-2022 00:00	ASS12_2m		✓					
EP2201003-049	25-Jan-2022 00:00	ASS12_2.25m		✓					
EP2201003-050	25-Jan-2022 00:00	ASS12_2.5m		✓					
EP2201003-051	25-Jan-2022 00:00	ASS12_2.75m		✓					
EP2201003-052	25-Jan-2022 00:00	ASS12_3m		✓					
EP2201003-053	25-Jan-2022 00:00	SS25_0m			✓	✓	✓		✓
EP2201003-054	25-Jan-2022 00:00	SS25_0.5m			✓	✓	✓		✓
EP2201003-055	25-Jan-2022 00:00	SS25_1.0	✓						
EP2201003-056	25-Jan-2022 00:00	SS25_2.0	✓						
EP2201003-057	25-Jan-2022 00:00	ASS18_0m		✓					
EP2201003-058	25-Jan-2022 00:00	ASS18_0.25m		✓					
EP2201003-059	25-Jan-2022 00:00	ASS18_0.5m		✓					
EP2201003-060	25-Jan-2022 00:00	ASS18_0.75m		✓					
EP2201003-061	25-Jan-2022 00:00	SS21_1.0m		✓					
EP2201003-062	25-Jan-2022 00:00	ASS18_1.25m		✓					
EP2201003-063	25-Jan-2022 00:00	ASS18_1.5m		✓					
EP2201003-064	25-Jan-2022 00:00	ASS18_1.75m		✓					
EP2201003-065	25-Jan-2022 00:00	ASS18_2m		✓					
EP2201003-066	25-Jan-2022 00:00	ASS18_2.25m		✓					
EP2201003-067	25-Jan-2022 00:00	ASS18_2.5m		✓					
EP2201003-068	25-Jan-2022 00:00	ASS14_0m		✓					
EP2201003-069	25-Jan-2022 00:00	ASS14_0.25m		✓					
EP2201003-070	25-Jan-2022 00:00	ASS14_0.5m		✓					
EP2201003-071	25-Jan-2022 00:00	ASS14_0.75m		✓					
EP2201003-072	25-Jan-2022 00:00	SS26_0m			✓	✓	✓		✓
EP2201003-073	25-Jan-2022 00:00	SS26_0.5m			✓	✓	✓		✓
EP2201003-074	25-Jan-2022 00:00	SS26_1m	✓						
EP2201003-075	25-Jan-2022 00:00	SS21_0m			✓	✓	✓		✓
EP2201003-076	25-Jan-2022 00:00	SS21_0.5m			✓	✓	✓		✓

			(On Hold) SOIL No analysis requested	SOIL - EA037 ASS Field Screening Analysis	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)	SOIL - EP262 Ethanolamines in Soils	SOIL - S-02 8 Metals (incl. Digestion)	SOIL - S-13 OC/OP/PCB
EP2201003-077	25-Jan-2022 00:00	SS21_1.0m	✓						
EP2201003-078	25-Jan-2022 00:00	SS21_2.0m	✓						
EP2201003-079	25-Jan-2022 00:00	QC3			✓	✓		✓	
EP2201003-080	25-Jan-2022 00:00	QC5		✓					
EP2201003-081	25-Jan-2022 00:00	QC6	✓						
EP2201003-082	25-Jan-2022 00:00	QC7		✓					
EP2201003-083	25-Jan-2022 00:00	QC8	✓						
EP2201003-084	25-Jan-2022 00:00	QC9		✓					
EP2201003-085	25-Jan-2022 00:00	QC10	✓						

Matrix: **SOIL**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	SOIL - S-26 8 metals/TRH/BTEXN/PAH
EP2201003-053	25-Jan-2022 00:00	SS25_0m	✓
EP2201003-054	25-Jan-2022 00:00	SS25_0.5m	✓
EP2201003-072	25-Jan-2022 00:00	SS26_0m	✓
EP2201003-073	25-Jan-2022 00:00	SS26_0.5m	✓
EP2201003-075	25-Jan-2022 00:00	SS21_0m	✓
EP2201003-076	25-Jan-2022 00:00	SS21_0.5m	✓

Matrix: **WATER**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - EP262 Ethanolamines by LCMSMS	WATER - W-02 8 Metals	WATER - W-04 TRH/BTEXN
EP2201003-086	25-Jan-2022 00:00	QC11	✓	✓	✓	
EP2201003-087	25-Jan-2022 00:00	QC12				✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (BURSWOOD)

- A4 - AU Tax Invoice (INV)	Email	accounts.burb@coffey.com

Bernie Weekes

- *AU Certificate of Analysis - NATA (COA)	Email	bernie.weekes@coffey.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bernie.weekes@coffey.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bernie.weekes@coffey.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bernie.weekes@coffey.com
- Chain of Custody (CoC) (COC)	Email	bernie.weekes@coffey.com
- EDI Format - ESDAT (ESDAT)	Email	bernie.weekes@coffey.com
- EDI Format - XTab (XTAB)	Email	bernie.weekes@coffey.com

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:

Report Results to: BERNIE WEEKES — Mobile: 0407 817 762 — Email: bernie.weekes@coffey.com ~~@tetratech.com~~

Invoices to: COFFEY ACCOUNTS — Phone: — Email: @tetratech.com

Project No: 754_PEREN215757 — Task No: LAB

Project Name: PERDAMAN — Laboratory: ALS

Sampler's Name: NICK TAYLOR/CONNOR RICHARDS — Project Manager: BERNIE WEEKES

Quote number (if different to current quoted prices): EP/1105/21

Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S2	EP231X	EP262	W16T	W04	HOLD	NOTES
1	SS24_0m	25/1/22		SOIL	2J, 1P	5DAY								EMAIL EA037 RESULTS TO BERNIE (pm) ASAP.
2	SS24_0.5m							X	X	X				
3	SS24_1.0m													
4	SS24_2.0m												X	
5	AS510_0m				1Z		X						X	
6	AS510_0.25m						X							
7	AS510_0.5m						X							
8	AS510_0.75m						X							
9	AS510_1.0m						X							
10	AS510_1.25m						X							
11	AS510_1.5m						X							
12	AS510_1.75m						X							
13	AS510_2.0m						X							
14	AS510_2.25m						X							
15	AS510_2.5m						X							
16	AS510_2.75m						X							

Environmental Division Perth
Work Order Reference
EP2201003
Telephone : -- 61-8-9406 1301

RELINQUISHED BY

Name: NICK TAYLOR — Date: 26/1/22 — Time: 15:45
Coffey

Name: — Date: — Time:
Company:

RECEIVED BY

Name: LOUFFY — Date: 31/1/22 — Time: 1145
Company: ALS

Name: — Date: — Time:
Company:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:
Report Results to: BERNIE WEEKES — Mobile: 0407 817 762 — Email: bernie.weekes@coffey.com
Invoices to: COFFEY ACCOUNTS — Phone: — Email: @tetratech.com

Project No: 754 _ PERTH 295751 — Task No: LAB
Project Name: PERDAMAN — Laboratory: ALS
Sampler's Name: CONNOR RICHARDS / NICK TAYLOR — Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section: EA037, S2, EP231X, EP262, WET, WET HOLD

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S2	EP231X	EP262	WET	WET HOLD	NOTES
17	AS510_3.0m	25/1/22		SOIL	1Z	5DAY	X						EMAIL EA037 RESULTS TO BERNIE(pm) ASAP.
18	AS59_0m	↓		↓	↓	↓	X						
19	AS59_0.25m						X						
20	AS59_0.5m						X						
21	AS59_0.75m						X						
22	AS59_1.0m						X						
23	AS59_1.25m						X						
24	AS59_1.5m						X						
25	AS59_1.75m						X						
26	AS59_2m						X						
27	AS59_2.25m						X						
28	AS59_2.5m						X						
29	AS59_2.75m						X						
30	AS59_3m				↓		X						
31	SS22_0m				2J, 1P			X	X	X			
32	SS22_0.5m	↓		↓	2J, 1P	↓						X	

RELINQUISHED BY		RECEIVED BY	
Name: NICK TAYLOR	Date: 26/1/22	Name:	Date:
Coffey	Time: 15:45	Company:	Time:
Name:	Date:	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)
- All Samples Recieved in Good Condition ☐
- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

*Container Type & Preservation Codes: **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:

Report Results to: BERNIE WEEKES — Mobile: 0407 817 762 — Email: bernie.weekes@coffey.com

Invoices to: — Phone: — Email: @tetratech.com

Project No: 754_PERFN295751 — Task No: LAB

Project Name: PERDAMAN — Laboratory: ALS

Sampler's Name: CONNOR RICHARDS/NICK TAYLOR — Project Manager: BERNIE WEEKES

Quote number (if different to current quoted prices): EP/1105/21

Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S2	EP231X	EP262	W16T	W04	HOLD	NOTES
33	SS22_1.0m	25/1/22		Soil	2J, 1P	5 DAY		X	X	X				EMAIL EA037 RESULTS TO BERNIE (PM) ASAP.
34	SS22_2.0m				2J, 1P								X	
35	AS11_0m				1Z		X							
36	AS11_0.25m						X							
37	AS11_0.5m						X							
38	AS11_0.75m						X							
39	AS11_1.0m						X							
SNR40	AS11_1.25m						X							
SNR41	AS11_1.5m						X							
SNR42	AS11_1.75m						X							
SNR43	AS11_2m						X							
SNR44	AS11_2.25m						X							
SNR45	AS11_2.5m						X							
SNR46	AS11_2.75m						X							
SNR47	AS11_3m						X							
40 45	AS12_0m						X							

RELINQUISHED BY		RECEIVED BY	
Name: NICK TAYLOR	Date: 26/1/22	Name:	Date:
Coffey	Time: 15:45	Company:	Time:
Name:	Date:	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)

- All Samples Recieved in Good Condition ☐
- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

*Container Type & Preservation Codes: **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

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Phone:
Email: bernie.weekes@coffey.com ~~@tetratech.com~~
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Project No: 754_PERGN295751
Task No: LAB
Project Name: PERDAMAN
Laboratory: ALS
Sampler's Name: CONNOR RICHARDS / NICK TAYLOR
Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S2	EP231X	EP262	W16T	W04	HOLD	S13	S26					NOTES
41 ~~49~~	ASS12_0.25m	25/1/22		SOIL	1Z	5DAY	X													EMAIL EA037 RESULTS TO BERNIE (PM) ASAP
42 ~~50~~	ASS12_0.5m						X													
43 ~~51~~	ASS12_0.75m						X													
44 ~~52~~	ASS12_1.0m						X													
45 ~~53~~	ASS12_1.25m						X													
46 ~~54~~	ASS12_1.5m						X													
47 ~~55~~	ASS12_1.75m						X													
48 ~~56~~	ASS12_2m						X													
49 ~~57~~	ASS12_2.25m						X													
50 ~~58~~	ASS12_2.5m						X													
51 ~~59~~	ASS12_2.75m						X													
52 ~~60~~	ASS12_3m						X													
53 ~~61~~	SS25_0m				2J, 1P				X	X				X	X					
54 ~~62~~	SS25_0.5m								X	X				X	X					
55 ~~63~~	SS25_1.0m												X							
56 ~~64~~	SS25_2.0m												X							

RELINQUISHED BY		RECEIVED BY	
Name: NICK TAYLOR	Date: 26/1/22 →	Name:	Date:
Coffey	Time: 15:45	Company:	Time:
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)
All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

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Email: @tetratech.com

Project No: 754_PEREN295751
Task No: LAB
Project Name: PERDAMAN
Laboratory: ALS
Sampler's Name: NICK TAYLOR / CONNOR RICHARDS
Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S2	EP231X	EP262	W16T	W04	HOLD	S13	S26					NOTES
57	AS518_0m	25/1/22		SOIL	1Z	5 DAY	X													EMAIL EA037 RESULTS TO BERNIE(PM) ASAP.
58	AS518_0.25m						X													
59	AS518_0.5m						X													
60	AS518_0.75m						X													
61	AS518_1.0m						X													
62	AS518_1.25m						X													
63	AS518_1.5m						X													
64	AS518_1.75m						X													
65	AS518_2m						X													
66	AS518_2.25m						X													
67	AS518_2.5m						X													
68	AS514_0m						X													
69	AS514_0.25m						X													
70	AS514_0.5m						X													
71	AS514_0.75m						X													
72	SS26_0m				2J, 1P				X	X				X	X					

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Name: NICK TAYLOR	Date: 26/1/22 →	Name:	Date:
Coffey	Time: 15:45	Company:	Time:
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)
All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

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Project No: 754_PERGN295751
Task No: LAB
Project Name: PERDAMAN
Laboratory: ALS
Sampler's Name: NICK TAYLOR/CONNOR RICHARDS
Project Manager: BERNIE WEEKES
Quote number (if different to current quoted prices): EP/1105/21
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	S26	EP231X	EP262	W16T	W04	HOLD	S13	S2	W-7	W-04			NOTES
73	SS26_0.5m	25/1/22		SOIL	2J, 1P	5 DAY		X	X	X				X						EMAIL EO37 RESULTS TO BERNIE(PM) ASAP.
74	SS26_1m												X	X						
75	SS21_0m							X	X	X										
76	SS21_0.5m							X	X	X				X						
77	SS21_1.0m																			
78	SS21_2.0m												X							
79	QC3												X							PLEASE FILTER METALS BOTTLES.
EUR	QC4								X	X					X					
80	QC5				1Z				X	X					X					
81	QC6						X													PLEASE FORWARD QC4 TO EUROFINS & ASK THEM TO ADOPT SAME LEVELS OF REPORTING.
82	QC7												X							
83	QC8						X													
84	QC9												X							
85	QC10						X													
86	QC11												X							
87	QC12			WATER	2G, 3P, 2V				X	X						X				
				WATER	1G, 2V												X			

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Name: NICK TAYLOR
Coffey
Date: 26/1/22
Time: 15:45.

Name:
Company:
Date:
Time:

RECEIVED BY

Name:
Company:
Date:
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Date:
Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201008**	Page	: 1 of 31
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 31-Jan-2022 11:45
Order number	: ----	Date Analysis Commenced	: 01-Feb-2022
C-O-C number	: ----	Issue Date	: 08-Feb-2022 13:59
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 56		
No. of samples analysed	: 52		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Uyen Dalkin	Approved Asbestos Identifier	Melbourne Asbestos, Springvale, VIC
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Asbestos conducted by ALS Melbourne, NATA accreditation no. 825, site no 13778
- PFAS and Ethanolamines conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP262: Poor matrix spike recovery for particular compounds due to matrix interferences.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EP075(SIM): Poor surrogate recoveries for EP2201008 due to suspected matrix effects and interferences.
- **EA200: As only one sample container was submitted for multiple tests, at the client's request, sub sampling was conducted prior to Asbestos analysis. As this has the potential to understate detection, results should be scrutinised accordingly.**
- EP262: ALS is not NATA accredited for the analysis of MDEA.
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend

- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS16_0m	ASS16_0.25m	ASS16_0.5m	ASS16_0.75m	ASS16_1.0m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-001	EP2201008-002	EP2201008-003	EP2201008-004	EP2201008-005
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.5**	**8.4**	**8.9**	**8.8**	**8.6**
pH (Fox)	----	0.1	pH Unit	**7.0**	**7.0**	**7.2**	**7.2**	**7.0**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS16_1.25m	ASS16_1.5m	ASS16_1.75m	ASS16_2.0m	ASS16_2.25m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-006	EP2201008-007	EP2201008-008	EP2201008-009	EP2201008-010
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.7**	**8.6**	**9.1**	**9.1**	**9.1**
pH (Fox)	----	0.1	pH Unit	**6.9**	**7.1**	**6.9**	**6.9**	**6.9**
Reaction Rate	----	1	-	**Slight**	**Slight**	**Slight**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS16_2.5m	ASS16_2.75m	ASS16_3.0m	ASS15_0m	ASS15_0.25m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-011	EP2201008-012	EP2201008-013	EP2201008-014	EP2201008-015
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**9.0**	**8.8**	**8.6**	**8.6**	**8.6**
pH (Fox)	----	0.1	pH Unit	**6.8**	**7.4**	**6.9**	**6.7**	**6.8**
Reaction Rate	----	1	-	**Slight**	**Moderate**	**Moderate**	**Moderate**	**Moderate**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS15_0.5m	ASS15_0.75m	ASS15_1.0m	ASS15_1.25m	ASS15_1.5m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-016	EP2201008-017	EP2201008-018	EP2201008-019	EP2201008-020
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**9.6**	**10.2**	**9.9**	**9.9**	**10.0**
pH (Fox)	----	0.1	pH Unit	**8.1**	**7.4**	**7.3**	**7.3**	**9.0**
Reaction Rate	----	1	-	**Moderate**	**Slight**	**Slight**	**Slight**	**Moderate**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS15_1.75m	ASS15_2.0m	ASS17_0m	ASS17_0.25m	ASS17_0.5m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-021	EP2201008-022	EP2201008-023	EP2201008-024	EP2201008-025
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**9.5**	**9.8**	**9.5**	**9.6**	**10.0**
pH (Fox)	----	0.1	pH Unit	**7.3**	**6.9**	**7.5**	**8.0**	**7.5**
Reaction Rate	----	1	-	**Moderate**	**Slight**	**Moderate**	**Moderate**	**Moderate**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS17_0.75m	ASS13_0m	ASS13_0.25m	ASS13_0.5m	ASS13_0.75m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-026	EP2201008-027	EP2201008-028	EP2201008-029	EP2201008-030
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**9.8**	**8.6**	**8.7**	**8.6**	**9.0**
pH (Fox)	----	0.1	pH Unit	**7.6**	**6.9**	**7.7**	**7.1**	**7.2**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS13_1.0m	ASS6_0m	ASS6_0.25m	ASS6_0.5m	ASS6_0.75m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-031	EP2201008-032	EP2201008-033	EP2201008-034	EP2201008-035
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**9.5**	**8.2**	**7.6**	**7.6**	**7.9**
pH (Fox)	----	0.1	pH Unit	**8.8**	**6.6**	**6.7**	**6.6**	**6.6**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS6_1.0m	ASS7_0m	ASS7_0.25m	ASS7_0.5m	ASS7_0.75m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-036	EP2201008-037	EP2201008-038	EP2201008-039	EP2201008-040
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**7.6**	**7.8**	**7.9**	**7.8**	**7.8**
pH (Fox)	----	0.1	pH Unit	**5.9**	**6.5**	**6.3**	**6.6**	**6.6**
Reaction Rate	----	1	-	**Moderate**	**Slight**	**Moderate**	**Slight**	**Slight**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC15	SS14_0m	SS14_1.0m	SS15_0m	SS15_0.5m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-041	EP2201008-043	EP2201008-045	EP2201008-047	EP2201008-048
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	9.7	----	----	----	----
pH (Fox)	----	0.1	pH Unit	7.2	----	----	----	----
Reaction Rate	----	1	-	Slight	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	----	26.4	19.6	15.3	13.2
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	----	----	----	No	No
Asbestos (Trace)	1332-21-4	5	Fibres	----	----	----	No	No
Asbestos Type	1332-21-4	-	--	----	----	----	-	-
Sample weight (dry)	----	0.01	g	----	----	----	24.0	38.8
APPROVED IDENTIFIER:	----	-	--	----	----	----	U.DALKIN	U.DALKIN
Synthetic Mineral Fibre	----	0.1	g/kg	----	----	----	No	No
Organic Fibre	----	0.1	g/kg	----	----	----	Yes	No
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	8	<5	8	7
Cadmium	7440-43-9	1	mg/kg	----	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	----	24	16	31	20
Copper	7440-50-8	5	mg/kg	----	5	<5	9	8
Lead	7439-92-1	5	mg/kg	----	<5	<5	<5	<5
Nickel	7440-02-0	2	mg/kg	----	9	9	16	12
Zinc	7440-66-6	5	mg/kg	----	10	44	18	17
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC15	SS14_0m	SS14_1.0m	SS15_0m	SS15_0.5m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-041	EP2201008-043	EP2201008-045	EP2201008-047	EP2201008-048
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
^ Total Chlordane (sum)	----	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	----	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	----	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	----	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	----	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	----	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC15	SS14_0m	SS14_1.0m	SS15_0m	SS15_0.5m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-041	EP2201008-043	EP2201008-045	EP2201008-047	EP2201008-048
				Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued								
Ethion	563-12-2	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	----	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	----	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	----	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC15	SS14_0m	SS14_1.0m	SS15_0m	SS15_0.5m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-041	EP2201008-043	EP2201008-045	EP2201008-047	EP2201008-048
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
>C10 - C16 Fraction	----	50	mg/kg	----	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	----	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	----	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	----	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	----	<1	<1	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	----	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	----	**0.0003**	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC15	SS14_0m	SS14_1.0m	SS15_0m	SS15_0.5m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-041	EP2201008-043	EP2201008-045	EP2201008-047	EP2201008-048
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC15	SS14_0m	SS14_1.0m	SS15_0m	SS15_0.5m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-041	EP2201008-043	EP2201008-045	EP2201008-047	EP2201008-048
				Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued								
Sum of PFAS	----	0.0002	mg/kg	----	0.0003	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	----	0.0003	<0.0002	<0.0002	<0.0002
EP262: Ethanolamines								
Ethanolamine	141-43-5	10	mg/kg	----	<10	<10	<10	<10
Diethanolamine	111-42-2	10	mg/kg	----	<10	<10	<10	<10
Methyl diethanolamine (MDEA)	105-59-9	10	mg/kg	----	<10	<10	<10	<10
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	----	108	108	75.7	102
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	----	82.2	121	97.3	114
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	----	131	28.9	89.4	46.3
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	----	51.6	45.9	47.2	51.6
2-Chlorophenol-D4	93951-73-6	0.5	%	----	52.5	46.8	50.3	51.0
2.4.6-Tribromophenol	118-79-6	0.5	%	----	23.5	24.3	66.0	21.9
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	----	56.7	52.4	54.8	55.8
Anthracene-d10	1719-06-8	0.5	%	----	100	81.8	96.4	89.1
4-Terphenyl-d14	1718-51-0	0.5	%	----	74.4	59.5	49.4	76.9
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	102	85.4	96.1	95.7
Toluene-D8	2037-26-5	0.2	%	----	104	109	105	109
4-Bromofluorobenzene	460-00-4	0.2	%	----	98.7	106	99.5	102
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	----	107	106	108	108
13C8-PFOA	----	0.0002	%	----	102	102	104	108

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS13_0m	SS13_0.5m	QC13	SS12_0m	SS12_0.5m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-049	EP2201008-050	EP2201008-051	EP2201008-054	EP2201008-055
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	15.4	22.4	26.4	22.5	22.0
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	----	----	No	----	----
Asbestos (Trace)	1332-21-4	5	Fibres	----	----	No	----	----
Asbestos Type	1332-21-4	-	--	----	----	-	----	----
Sample weight (dry)	----	0.01	g	----	----	23.1	----	----
APPROVED IDENTIFIER:	----	-	--	----	----	U.DALKIN	----	----
Synthetic Mineral Fibre	----	0.1	g/kg	----	----	No	----	----
Organic Fibre	----	0.1	g/kg	----	----	No	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	5	10	14	6	8
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	24	35	29	26	17
Copper	7440-50-8	5	mg/kg	11	9	5	<5	6
Lead	7439-92-1	5	mg/kg	<5	<5	<5	<5	<5
Nickel	7440-02-0	2	mg/kg	13	15	12	10	7
Zinc	7440-66-6	5	mg/kg	19	15	10	6	8
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS13_0m	SS13_0.5m	QC13	SS12_0m	SS12_0.5m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-049	EP2201008-050	EP2201008-051	EP2201008-054	EP2201008-055
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS13_0m	SS13_0.5m	QC13	SS12_0m	SS12_0.5m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-049	EP2201008-050	EP2201008-051	EP2201008-054	EP2201008-055
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS13_0m	SS13_0.5m	QC13	SS12_0m	SS12_0.5m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-049	EP2201008-050	EP2201008-051	EP2201008-054	EP2201008-055
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0004**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	**0.0002**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS13_0m	SS13_0.5m	QC13	SS12_0m	SS12_0.5m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-049	EP2201008-050	EP2201008-051	EP2201008-054	EP2201008-055
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	**0.0006**	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0004**	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS13_0m	SS13_0.5m	QC13	SS12_0m	SS12_0.5m
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00	26-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201008-049	EP2201008-050	EP2201008-051	EP2201008-054	EP2201008-055
				Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued								
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0004**	<0.0002	<0.0002	<0.0002	<0.0002
EP262: Ethanolamines								
Ethanolamine	141-43-5	10	mg/kg	<10	<10	<10	<10	<10
Diethanolamine	111-42-2	10	mg/kg	<10	<10	<10	<10	<10
Methyl diethanolamine (MDEA)	105-59-9	10	mg/kg	<10	<10	<10	<10	<10
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**97.8**	**65.3**	**98.3**	**86.0**	**89.6**
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**69.0**	**96.4**	**118**	**82.5**	**75.3**
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	**55.4**	**52.8**	**45.3**	**31.6**	**66.2**
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**49.6**	**45.0**	**51.1**	**88.7**	**86.0**
2-Chlorophenol-D4	93951-73-6	0.5	%	**49.6**	**46.7**	**58.7**	**83.6**	**84.9**
2.4.6-Tribromophenol	118-79-6	0.5	%	**66.0**	**25.3**	**26.5**	**96.1**	**90.4**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**54.2**	**60.5**	**63.1**	**112**	**114**
Anthracene-d10	1719-06-8	0.5	%	**121**	**64.9**	**86.3**	**106**	**109**
4-Terphenyl-d14	1718-51-0	0.5	%	**77.2**	**77.9**	**74.2**	**110**	**114**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**95.6**	**106**	**102**	**89.0**	**91.9**
Toluene-D8	2037-26-5	0.2	%	**106**	**113**	**110**	**84.4**	**82.4**
4-Bromofluorobenzene	460-00-4	0.2	%	**102**	**108**	**104**	**94.8**	**93.4**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**109**	**99.5**	**99.0**	**106**	**90.5**
13C8-PFOA	----	0.0002	%	**107**	**100**	**108**	**108**	**98.0**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC17	QC18	----	----	----
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201008-052	EP2201008-053	--------	--------	--------
				Result	Result	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	<1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	<0.5	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	----	----	----	----
beta-BHC	319-85-7	0.5	µg/L	<0.5	----	----	----	----
gamma-BHC	58-89-9	0.5	µg/L	<0.5	----	----	----	----
delta-BHC	319-86-8	0.5	µg/L	<0.5	----	----	----	----
Heptachlor	76-44-8	0.5	µg/L	<0.5	----	----	----	----
Aldrin	309-00-2	0.5	µg/L	<0.5	----	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	----	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	----	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	----	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	----	----	----	----
Dieldrin	60-57-1	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDE	72-55-9	0.5	µg/L	<0.5	----	----	----	----
Endrin	72-20-8	0.5	µg/L	<0.5	----	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDD	72-54-8	0.5	µg/L	<0.5	----	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	----	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDT	50-29-3	2.0	µg/L	<2.0	----	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	----	----	----	----
Methoxychlor	72-43-5	2.0	µg/L	<2.0	----	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC17	QC18	----	----	----
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201008-052	EP2201008-053	--------	--------	--------
				Result	Result	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	<0.5	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	----	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	----	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	----	----	----	----
Dimethoate	60-51-5	0.5	µg/L	<0.5	----	----	----	----
Diazinon	333-41-5	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	----	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	----	----	----	----
Malathion	121-75-5	0.5	µg/L	<0.5	----	----	----	----
Fenthion	55-38-9	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	----	----	----	----
Parathion	56-38-2	2.0	µg/L	<2.0	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	----	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	----	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	----	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	----	----	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	----	----	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	----	----	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	----	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC17	QC18	----	----	----
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201008-052	EP2201008-053	--------	--------	--------
				Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC17	QC18	----	----	----
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201008-052	EP2201008-053	--------	--------	--------
				Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC17	QC18	----	----	----
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201008-052	EP2201008-053	--------	--------	--------
				Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<1	----	----	----	----
Diethanolamine	111-42-2	1	µg/L	<1	----	----	----	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	----	----	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	1	%	**50.0**	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	**69.7**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	**64.2**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC17	QC18	----	----	----
			Sampling date / time	26-Jan-2022 00:00	26-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201008-052	EP2201008-053	--------	--------	--------
				Result	Result	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates - Continued								
Phenol-d6	13127-88-3	1.0	%	17.4	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	41.3	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	20.8	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	51.7	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%	66.0	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	73.2	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	94.3	93.4	----	----	----
Toluene-D8	2037-26-5	2	%	102	103	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	93.2	94.9	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	115	----	----	----	----
13C8-PFOA	----	0.02	%	109	----	----	----	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	SS15_0m - 26-Jan-2022 00:00	Orange soil with rock and organic matter.
EA200: Description	SS15_0.5m - 26-Jan-2022 00:00	Orange soil with rock matter.
EA200: Description	QC13 - 26-Jan-2022 00:00	Beige soil with rock matter.

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	43	119
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	53	152
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	28	152
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	57	119
2-Chlorophenol-D4	93951-73-6	52	130
2.4.6-Tribromophenol	118-79-6	40	132
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	53	139
Anthracene-d10	1719-06-8	68	124
4-Terphenyl-d14	1718-51-0	66	132
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	63	132
Toluene-D8	2037-26-5	66	125
4-Bromofluorobenzene	460-00-4	60	124
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	27	136
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	50	146
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	27	153
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	67
2-Chlorophenol-D4	93951-73-6	29	120
2.4.6-Tribromophenol	118-79-6	10	131
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	34	131
Anthracene-d10	1719-06-8	43	126
4-Terphenyl-d14	1718-51-0	41	142

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Melbourne, NATA accreditation no. 825, site no. 13778 (Chemistry).

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EP262: Ethanolamines

(WATER) EP262: Ethanolamines

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2201008**	Page	: 1 of 30
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 31-Jan-2022
Order number	: ----	Date Analysis Commenced	: 01-Feb-2022
C-O-C number	: ----	Issue Date	: 08-Feb-2022
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 56		
No. of samples analysed	: 52		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Uyen Dalkin	Approved Asbestos Identifier	Melbourne Asbestos, Springvale, VIC
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4152608)									
EP2201008-043	SS14_0m	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	24	22	4.7	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	9	9	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	8	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	5	5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	10	10	0.0	No Limit
EP2201074-002	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	35	38	6.5	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	47	43	9.5	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	8	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	17	16	9.6	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	9	18.7	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	37	36	3.4	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 4152503)									
EP2201008-001	ASS16_0m	EA037: pH (F)	----	0.1	pH Unit	8.5	8.5	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	7.0	7.0	0.0	0% - 20%
EP2201008-010	ASS16_2.25m	EA037: pH (F)	----	0.1	pH Unit	9.1	9.1	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.9	6.9	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 4152504)									
EP2201008-021	ASS15_1.75m	EA037: pH (F)	----	0.1	pH Unit	9.5	9.5	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	7.3	7.3	0.0	0% - 20%
EP2201008-030	ASS13_0.75m	EA037: pH (F)	----	0.1	pH Unit	9.0	8.9	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	7.2	7.0	2.1	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA037: Ass Field Screening Analysis (QC Lot: 4152505)									
EP2201008-041	QC15	EA037: pH (F)	----	0.1	pH Unit	9.7	9.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	7.2	7.2	0.0	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4150669)									
EP2201008-051	QC13	EA055: Moisture Content	----	0.1	%	26.4	26.5	0.0	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4152602)									
EP2201008-043	SS14_0m	EA055: Moisture Content	----	0.1	%	26.4	28.1	6.0	0% - 20%
EP2201074-002	Anonymous	EA055: Moisture Content	----	0.1	%	6.5	6.4	1.7	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4152607)									
EP2201008-043	SS14_0m	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP2201074-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 4147683)									
EP2201003-053	Anonymous	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP2201008-049	SS13_0m	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 4149782)									
EP2201008-054	SS12_0m	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4147680)									
EP2201003-053	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4147680) - continued									
EP2201003-053	Anonymous	EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP2201008-049	SS13_0m	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4149781)									
EP2201008-054	SS12_0m	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4149781) - continued									
EP2201008-054	SS12_0m	EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4147680)									
EP2201003-053	Anonymous	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP2201008-049	SS13_0m	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4147680) - continued									
EP2201008-049	SS13_0m	EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4149781)									
EP2201008-054	SS12_0m	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4147682)									
EP2201003-053	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4147682) - continued									
EP2201003-053	Anonymous	EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP2201008-049	SS13_0m	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4149784)									
EP2201008-054	SS12_0m	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4149784) - continued									
EP2201008-054	SS12_0m	EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4147679)									
EP2201003-053	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP2201008-049	SS13_0m	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4147681)									
EP2201003-053	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP2201008-049	SS13_0m	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4149780)									
EP2201008-054	SS12_0m	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4149783)									
EP2201008-054	SS12_0m	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4147679)									
EP2201003-053	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP2201008-049	SS13_0m	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4147681)									
EP2201003-053	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP2201008-049	SS13_0m	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4149780)									
EP2201008-054	SS12_0m	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4149783)									
EP2201008-054	SS12_0m	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080: BTEXN (QC Lot: 4147679)									
EP2201003-053	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EP2201008-049	SS13_0m	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EP080: BTEXN (QC Lot: 4149780)									
EP2201008-054	SS12_0m	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4147922)									
EP2201010-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0240	0.0222	8.0	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0013	0.0013	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0043	0.0046	5.8	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2201008-051	QC13	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4151086)									

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4151086) - continued									
EP2201008-054	SS12_0m	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
ES2203033-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0005	0.0004	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0159	0.0150	5.6	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0003	0.0003	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4147922)									
EP2201010-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.319	0.344	7.6	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	1.21	1.15	4.6	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.114	0.111	2.3	0% - 20%
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0268	0.0283	5.4	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0063	0.0065	3.5	0% - 20%
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0056	0.0058	2.2	0% - 20%
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	0.0004	0.0004	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	0.089	0.084	5.5	0% - 20%
EP2201008-051	QC13	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4151086)									
EP2201008-054	SS12_0m	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4151086) - continued									
EP2201008-054	SS12_0m	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
ES2203033-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4147922)									
EP2201010-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2201008-051	QC13	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4147922) - continued									
EP2201008-051	QC13	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4151086)									
EP2201008-054	SS12_0m	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2203033-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4147922)									
EP2201010-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	0.0021	0.0023	9.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	2.98	2.84	4.5	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	0.0184	0.0196	6.0	0% - 20%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	0.0006	0.0007	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4147922) - continued									
EP2201008-051	QC13	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4151086)									
EP2201008-054	SS12_0m	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2203033-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 4147772)									
EP2201017-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0021	<0.0021	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.021	<0.021	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.021	<0.021	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.021	<0.021	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.021	<0.021	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.021	<0.021	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.105	<0.105	0.0	No Limit
EP2201020-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.002	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EG020T: Total Metals by ICP-MS (QC Lot: 4147772) - continued									
EP2201020-001	Anonymous	EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4147784)									
EP2201008-052	QC17	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4147727)									
EP2201003-087	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4147727)									
EP2201003-087	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 4147727)									
EP2201003-087	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP262: Ethanolamines (QC Lot: 4149135)									
EP2201003-086	Anonymous	EP262: Ethanolamine	141-43-5	1	µg/L	<1	<1	0.0	No Limit
		EP262: Diethanolamine	111-42-2	1	µg/L	<1	<1	0.0	No Limit
		EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	<1	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4152608)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	103	81.5	118
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	93.8	76.2	106
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	81.2	66.9	138
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	96.9	79.1	113
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	89.5	78.9	112
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	95.5	81.5	126
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	99.5	81.0	119
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4152607)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.154 mg/kg	99.2	81.0	115
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4147683)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	0.5 mg/kg	78.0	41.0	111
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4149782)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	0.5 mg/kg	70.0	41.0	111
EP068A: Organochlorine Pesticides (OC) (QCLot: 4147680)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	86.3	46.0	116
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	111	53.0	133
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	96.0	45.0	117
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	69.3	46.0	122
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	80.8	47.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	98.7	40.0	118
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	95.4	47.0	123
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	62.9	41.0	119
EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	85.3	43.0	119
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	75.6	41.0	131
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	92.5	41.0	119
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	84.6	41.0	127
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	95.7	44.0	122
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	77.3	37.0	129
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	87.1	41.0	127
EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	62.1	42.0	122
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	90.6	31.2	117
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	96.5	38.0	120

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4147680) - continued								
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	86.4	31.4	125
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	71.8	31.2	123
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	61.2	24.7	125
EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----
EP068A: Organochlorine Pesticides (OC) (QCLot: 4149781)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	87.2	46.0	116
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	87.3	53.0	133
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	59.5	45.0	117
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	102	46.0	122
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	80.2	47.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	49.6	40.0	118
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	91.6	47.0	123
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	66.5	41.0	119
EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	93.6	43.0	119
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	88.9	41.0	131
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	92.0	41.0	119
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	76.8	41.0	127
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	80.6	44.0	122
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	82.3	37.0	129
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	70.0	41.0	127
EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	86.5	42.0	122
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	91.7	31.2	117
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	61.2	38.0	120
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	86.0	31.4	125
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	60.2	31.2	123
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	86.5	24.7	125
EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4147680)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	64.3	61.0	141
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	59.2	39.0	147
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	7.8	4.10	154

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4147680) - continued								
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	100	40.0	136
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	93.5	59.0	133
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	71.2	57.0	135
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	88.9	39.0	133
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	81.8	53.0	131
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	53.1	53.0	133
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	66.6	57.0	135
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	47.3	45.0	131
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	62.9	53.0	137
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	62.3	53.0	133
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	89.5	49.0	133
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	63.0	39.0	137
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	71.9	57.0	137
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	63.7	53.0	135
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	70.0	52.0	134
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	30.8	20.4	154
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4149781)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	92.2	61.0	141
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.2	39.0	147
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	5.9	4.10	154
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	51.5	40.0	136
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	83.4	59.0	133
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	86.7	57.0	135
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	83.0	39.0	133
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	53.9	53.0	131
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	80.5	53.0	133
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	94.9	57.0	135
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	59.3	45.0	131
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	123	53.0	137
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	71.3	53.0	133
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	98.8	49.0	133
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	84.0	39.0	137
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	80.2	57.0	137
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	99.8	53.0	135
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	83.1	52.0	134
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	25.0	20.4	154
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4147682)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	112	71.0	123
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	110	69.0	129

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4147682) - continued								
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	111	65.0	125
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	113	71.0	125
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	102	66.0	124
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	84.5	60.0	112
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	90.3	67.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	110	65.0	127
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	63.3	57.0	125
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	114	57.0	131
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	90.8	65.0	125
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	91.4	69.0	127
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	81.0	63.0	121
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	89.3	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	82.6	52.0	128
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	96.0	65.0	125
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4149784)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	93.4	71.0	123
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	90.6	69.0	129
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	93.5	65.0	125
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	89.8	71.0	125
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	90.3	66.0	124
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	100	60.0	112
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	93.7	67.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	100	65.0	127
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	82.3	57.0	125
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	86.5	57.0	131
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	88.0	65.0	125
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	90.2	69.0	127
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	81.3	63.0	121
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	76.7	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	71.8	52.0	128
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	78.9	65.0	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4147679)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	32 mg/kg	117	66.0	122
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4147681)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	1468 mg/kg	83.1	70.0	111
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3111 mg/kg	96.5	71.9	109

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4147681) - continued								
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	436 mg/kg	72.9	63.8	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4149780)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	32 mg/kg	92.5	66.0	122
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4149783)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	1468 mg/kg	84.3	70.0	111
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3111 mg/kg	93.9	71.9	109
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	436 mg/kg	92.6	63.8	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4147679)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	37 mg/kg	97.1	66.0	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4147681)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	2234 mg/kg	86.2	72.8	110
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	2553 mg/kg	90.8	67.8	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	69.3	50.3	123
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4149780)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	37 mg/kg	98.9	66.0	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4149783)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	2234 mg/kg	88.8	72.8	110
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	2553 mg/kg	95.3	67.8	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	89.2	50.3	123
EP080: BTEXN (QCLot: 4147679)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	113	72.0	122
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	118	75.0	119
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	119	73.0	121
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	108	74.0	122
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	119	75.0	121
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	112	64.0	126
EP080: BTEXN (QCLot: 4149780)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	81.4	72.0	122
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	80.6	75.0	119
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	87.6	73.0	121
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	91.4	74.0	122
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	93.8	75.0	121
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	80.1	64.0	126
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4147922)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.4	72.0	128

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4147922) - continued								
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.0	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.4	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4151086)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.8	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	69.2	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.8	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4147922)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	77.8	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.8	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.8	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.8	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.0	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.6	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.0	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.4	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	83.8	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4151086)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	76.6	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.8	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.6	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.8	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.8	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.0	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.9	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4147922)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.4	67.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4147922) - continued								
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	82.7	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	77.4	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	80.8	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.9	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.8	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.6	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4151086)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.6	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	82.2	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	80.8	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	79.6	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.6	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	73.2	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4147922)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	72.4	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	69.2	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	77.2	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	78.4	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4151086)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	88.8	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	80.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	74.0	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	90.4	69.2	143

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 4147772)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	105	89.6	118
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	103	89.2	116

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 4147772) - continued								
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	104	87.8	114
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	103	85.8	115
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	102	88.4	111
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	87.4	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	103	88.1	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4147784)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	105	85.1	115
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4147656)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	5 µg/L	82.0	36.2	90.2
EP068A: Organochlorine Pesticides (OC) (QCLot: 4147654)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	65.8	42.3	112
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	53.8	39.0	108
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	86.4	45.5	116
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	85.5	43.0	118
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	73.2	46.2	115
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	86.4	39.0	111
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	53.8	39.7	114
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	44.0	42.4	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	91.0	43.6	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	54.4	42.1	129
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	65.4	42.7	123
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	74.9	42.4	121
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	57.3	43.8	123
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	74.4	26.9	127
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	94.2	44.9	128
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	63.8	41.7	128
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	61.8	32.2	121
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	97.6	40.7	120
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	75.9	31.6	123
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	64.8	36.4	124
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	85.3	25.4	124
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4147654)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	109	38.8	110
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	91.4	34.6	115
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	4.4	----	----
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	30.3	27.8	102
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	97.4	46.1	122
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	90.0	46.6	118

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4147654) - continued								
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	91.9	26.8	110
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	56.2	38.8	119
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	84.4	45.0	119
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	59.0	44.6	118
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	34.7	30.2	112
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	95.0	43.2	123
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	57.2	41.1	119
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	99.6	34.4	125
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	39.6	19.9	123
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	69.2	38.0	121
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	82.8	39.5	121
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	84.3	39.7	119
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	36.5	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4147655)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	55.3	41.9	99.1
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	55.4	36.1	113
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	54.6	35.8	102
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	54.2	33.5	113
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	64.3	36.5	115
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	65.8	46.4	109
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	71.1	40.4	124
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	75.5	40.2	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	60.2	40.2	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	63.1	45.6	121
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	10 µg/L	63.7	43.2	123
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	64.7	47.3	121
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	62.4	44.8	123
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	59.9	38.8	120
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	62.6	39.4	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	68.1	40.1	123
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4147653)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	381 µg/L	52.0	39.3	103
EP071: C15 - C28 Fraction	----	100	µg/L	<100	389 µg/L	60.6	47.2	122
EP071: C29 - C36 Fraction	----	50	µg/L	<50	282 µg/L	62.3	42.5	119
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4147727)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	87.6	73.6	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4147653)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	393 µg/L	52.1	42.0	104
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	507 µg/L	61.1	46.2	116
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	276 µg/L	52.2	24.7	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4147727)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	89.9	73.9	115
EP080: BTEXN (QCLot: 4147727)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	106	84.1	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	84.2	81.0	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	104	84.4	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	102	84.3	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	98.0	86.5	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	94.8	77.0	118
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4152560)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	96.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	83.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	89.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	89.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	94.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	87.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4152560)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	94.9	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	98.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	120	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	96.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	97.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	104	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	102	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4152560)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	98.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	112	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	103	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	117	66.0	145

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4152560) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	99.1	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	98.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	93.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4152560)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	97.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	96.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	107	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	85.0	71.4	144
EP262: Ethanolamines (QCLot: 4149135)								
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	107	50.0	130
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	106	50.0	130
EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	10 µg/L	114	50.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4152608)							
EP2201008-043	SS14_0m	EG005T: Arsenic	7440-38-2	50 mg/kg	106	70.0	130
		EG005T: Cadmium	7440-43-9	12.5 mg/kg	96.0	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	101	70.0	130
		EG005T: Copper	7440-50-8	50 mg/kg	112	70.0	130
		EG005T: Lead	7439-92-1	50 mg/kg	98.1	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	98.0	70.0	130
		EG005T: Zinc	7440-66-6	50 mg/kg	88.8	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4152607)							
EP2201008-043	SS14_0m	EG035T: Mercury	7439-97-6	1 mg/kg	99.6	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4147683)							
EP2201003-054	Anonymous	EP066: Total Polychlorinated biphenyls	----	0.5 mg/kg	74.0	43.1	142
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4149782)							
EP2201008-055	SS12_0.5m	EP066: Total Polychlorinated biphenyls	----	0.5 mg/kg	80.0	43.1	142

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4147680)							
EP2201003-054	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	91.8	57.9	124
		EP068: Heptachlor	76-44-8	0.5 mg/kg	103	57.4	135
		EP068: Aldrin	309-00-2	0.5 mg/kg	106	59.6	125
		EP068: Dieldrin	60-57-1	0.5 mg/kg	104	62.2	131
		EP068: Endrin	72-20-8	0.5 mg/kg	90.2	55.8	138
		EP068: 4.4`-DDT	50-29-3	0.5 mg/kg	63.2	50.5	145
EP068A: Organochlorine Pesticides (OC) (QCLot: 4149781)							
EP2201008-055	SS12_0.5m	EP068: gamma-BHC	58-89-9	0.5 mg/kg	71.1	57.9	124
		EP068: Heptachlor	76-44-8	0.5 mg/kg	94.5	57.4	135
		EP068: Aldrin	309-00-2	0.5 mg/kg	103	59.6	125
		EP068: Dieldrin	60-57-1	0.5 mg/kg	96.1	62.2	131
		EP068: Endrin	72-20-8	0.5 mg/kg	114	55.8	138
		EP068: 4.4`-DDT	50-29-3	0.5 mg/kg	97.9	50.5	145
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4147680)							
EP2201003-054	Anonymous	EP068: Diazinon	333-41-5	0.5 mg/kg	105	59.5	128
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	71.8	60.3	128
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	105	58.8	127
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	99.0	60.7	128
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	64.4	60.0	129
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4149781)							
EP2201008-055	SS12_0.5m	EP068: Diazinon	333-41-5	0.5 mg/kg	88.0	59.5	128
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	89.4	60.3	128
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	86.5	58.8	127
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	88.4	60.7	128
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	60.4	60.0	129
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4147682)							
EP2201003-054	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	102	73.5	125
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	101	70.8	125
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4149784)							
EP2201008-055	SS12_0.5m	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	90.9	73.5	125
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	97.1	70.8	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4147679)							
EP2201003-054	Anonymous	EP080: C6 - C9 Fraction	----	24 mg/kg	84.6	69.1	135
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4147681)							
EP2201003-054	Anonymous	EP071: C10 - C14 Fraction	----	1468 mg/kg	82.7	64.7	126
		EP071: C15 - C28 Fraction	----	3111 mg/kg	95.5	61.7	124
		EP071: C29 - C36 Fraction	----	436 mg/kg	71.0	64.6	131

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4149780)							
EP2201008-055	SS12_0.5m	EP080: C6 - C9 Fraction	----	24 mg/kg	79.3	69.1	135
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4149783)							
EP2201008-055	SS12_0.5m	EP071: C10 - C14 Fraction	----	1468 mg/kg	87.9	64.7	126
		EP071: C15 - C28 Fraction	----	3111 mg/kg	97.3	61.7	124
		EP071: C29 - C36 Fraction	----	436 mg/kg	92.0	64.6	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4147679)							
EP2201003-054	Anonymous	EP080: C6 - C10 Fraction	C6_C10	29 mg/kg	74.4	69.1	135
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4147681)							
EP2201003-054	Anonymous	EP071: >C10 - C16 Fraction	----	2234 mg/kg	85.5	64.7	126
		EP071: >C16 - C34 Fraction	----	2553 mg/kg	89.6	61.7	124
		EP071: >C34 - C40 Fraction	----	150 mg/kg	65.8	64.6	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4149780)							
EP2201008-055	SS12_0.5m	EP080: C6 - C10 Fraction	C6_C10	29 mg/kg	69.8	69.1	135
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4149783)							
EP2201008-055	SS12_0.5m	EP071: >C10 - C16 Fraction	----	2234 mg/kg	92.3	64.7	126
		EP071: >C16 - C34 Fraction	----	2553 mg/kg	98.3	61.7	124
		EP071: >C34 - C40 Fraction	----	150 mg/kg	86.4	64.6	131
EP080: BTEXN (QCLot: 4147679)							
EP2201003-054	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	95.2	76.4	118
		EP080: Toluene	108-88-3	2 mg/kg	96.8	67.4	112
EP080: BTEXN (QCLot: 4149780)							
EP2201008-055	SS12_0.5m	EP080: Benzene	71-43-2	2 mg/kg	91.8	76.4	118
		EP080: Toluene	108-88-3	2 mg/kg	86.8	67.4	112
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4147922)							
EP2201010-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	# Not Determined	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	# 67.2	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	76.8	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	73.2	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	77.2	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	67.6	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4151086)							
EP2201008-054	SS12_0m	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	79.6	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	86.4	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	82.0	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	78.8	70.0	132

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4151086) - continued							
EP2201008-054	SS12_0m	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	71.6	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	73.6	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4147922)							
EP2201010-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	# Not Determined	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	# Not Determined	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	# Not Determined	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	# Not Determined	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	# Not Determined	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	89.2	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	98.4	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	79.6	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	88.0	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	72.0	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	85.7	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4151086)							
EP2201008-054	SS12_0m	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	82.0	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	76.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	93.6	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	84.4	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	79.6	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	78.0	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	81.6	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	70.8	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	74.4	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	76.4	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	86.5	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4147922)							
EP2201010-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	82.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	90.5	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	91.3	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	# 135	68.7	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4147922) - continued							
EP2201010-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	80.3	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	75.6	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	86.0	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4151086)							
EP2201008-054	SS12_0m	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	70.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	79.0	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	87.0	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	89.4	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	88.9	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	76.4	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	75.2	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4147922)							
EP2201010-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	92.0	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	# Not Determined	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	# Not Determined	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	99.2	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4151086)							
EP2201008-054	SS12_0m	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	82.0	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	75.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	76.8	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	89.6	69.2	143

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EG020T: Total Metals by ICP-MS (QCLot: 4147772)							
EP2200979-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	100	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	101	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	95.3	70.0	130

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EG020T: Total Metals by ICP-MS (QCLot: 4147772) - continued							
EP2200979-002	Anonymous	EG020A-T: Copper	7440-50-8	1 mg/L	98.0	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	101	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	98.6	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	98.8	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4147784)							
EP2201018-002	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	99.9	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4147727)							
EP2201008-052	QC17	EP080: C6 - C9 Fraction	----	240 µg/L	93.6	77.0	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4147727)							
EP2201008-052	QC17	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	81.0	77.0	137
EP080: BTEXN (QCLot: 4147727)							
EP2201008-052	QC17	EP080: Benzene	71-43-2	20 µg/L	93.1	77.0	122
		EP080: Toluene	108-88-3	20 µg/L	85.8	73.5	126
EP262: Ethanolamines (QCLot: 4149135)							
EP2201003-086	Anonymous	EP262: Ethanolamine	141-43-5	10 µg/L	# 4.7	50.0	130
		EP262: Diethanolamine	111-42-2	10 µg/L	60.5	50.0	130
		EP262: Methyl diethanolamine (MDEA)	105-59-9	10 µg/L	68.9	50.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201008**	Page	: 1 of 16
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 31-Jan-2022
Site	: ----	Issue Date	: 08-Feb-2022
Sampler	: Nick Taylor	No. of samples received	: 56
Order number	: ----	No. of samples analysed	: 52

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2201010--001	Anonymous	**Perfluorobutane sulfonic acid (PFBS)**	375-73-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2201010--001	Anonymous	**Perfluoropentane sulfonic acid (PFPeS)**	2706-91-4	67.2 %	73.0-123%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2201010--001	Anonymous	**Perfluorobutanoic acid (PFBA)**	375-22-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2201010--001	Anonymous	**Perfluoropentanoic acid (PFPeA)**	2706-90-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2201010--001	Anonymous	**Perfluorohexanoic acid (PFHxA)**	307-24-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2201010--001	Anonymous	**Perfluoroheptanoic acid (PFHpA)**	375-85-9	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2201010--001	Anonymous	**Perfluorooctanoic acid (PFOA)**	335-67-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231C: Perfluoroalkyl Sulfonamides	EP2201010--001	Anonymous	**N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)**	24448-09-7	135 %	68.7-130%	**Recovery greater than upper data quality objective**
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EP2201010--001	Anonymous	**6:2 Fluorotelomer sulfonic acid (6:2 FTS)**	27619-97-2	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EP2201010--001	Anonymous	**8:2 Fluorotelomer sulfonic acid (8:2 FTS)**	39108-34-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP262: Ethanolamines	EP2201003--086	Anonymous	**Ethanolamine**	141-43-5	4.7 %	50.0-130%	**Recovery less than lower data quality objective**

Regular Sample Surrogates

Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment

Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-043	SS14_0m	**Phenol-d6**	13127-88-3	51.6 %	57.0-119 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-045	SS14_1.0m	**Phenol-d6**	13127-88-3	45.9 %	57.0-119 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-047	SS15_0m	**Phenol-d6**	13127-88-3	47.2 %	57.0-119 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-048	SS15_0.5m	**Phenol-d6**	13127-88-3	51.6 %	57.0-119 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-049	SS13_0m	**Phenol-d6**	13127-88-3	49.6 %	57.0-119 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-050	SS13_0.5m	**Phenol-d6**	13127-88-3	45.0 %	57.0-119 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-051	QC13	**Phenol-d6**	13127-88-3	51.1 %	57.0-119 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-045	SS14_1.0m	**2-Chlorophenol-D4**	93951-73-6	46.8 %	52.0-130 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-047	SS15_0m	**2-Chlorophenol-D4**	93951-73-6	50.3 %	52.0-130 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-048	SS15_0.5m	**2-Chlorophenol-D4**	93951-73-6	51.0 %	52.0-130 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-049	SS13_0m	**2-Chlorophenol-D4**	93951-73-6	49.6 %	52.0-130 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-050	SS13_0.5m	**2-Chlorophenol-D4**	93951-73-6	46.7 %	52.0-130 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-043	SS14_0m	**2.4.6-Tribromophenol**	118-79-6	23.5 %	40.0-132 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-045	SS14_1.0m	**2.4.6-Tribromophenol**	118-79-6	24.3 %	40.0-132 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-048	SS15_0.5m	**2.4.6-Tribromophenol**	118-79-6	21.9 %	40.0-132 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-050	SS13_0.5m	**2.4.6-Tribromophenol**	118-79-6	25.3 %	40.0-132 %	**Recovery less than lower data quality objective**
EP075(SIM)S: Phenolic Compound Surrogates	EP2201008-051	QC13	**2.4.6-Tribromophenol**	118-79-6	26.5 %	40.0-132 %	**Recovery less than lower data quality objective**
EP075(SIM)T: PAH Surrogates	EP2201008-045	SS14_1.0m	**2-Fluorobiphenyl**	321-60-8	52.4 %	53.0-139 %	**Recovery less than lower data quality objective**
EP075(SIM)T: PAH Surrogates	EP2201008-050	SS13_0.5m	**Anthracene-d10**	1719-06-8	64.9 %	68.0-124 %	**Recovery less than lower data quality objective**
EP075(SIM)T: PAH Surrogates	EP2201008-045	SS14_1.0m	**4-Terphenyl-d14**	1718-51-0	59.5 %	66.0-132 %	**Recovery less than lower data quality objective**
EP075(SIM)T: PAH Surrogates	EP2201008-047	SS15_0m	**4-Terphenyl-d14**	1718-51-0	49.4 %	66.0-132 %	**Recovery less than lower data quality objective**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	2	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	2	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
Container / *Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EA037: Ass Field Screening Analysis							
Snap Lock Bag - frozen on receipt at ALS (EA037)							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis - Continued							
ASS16_0m, ASS16_0.25m, ASS16_0.5m, ASS16_0.75m, ASS16_1.0m, ASS16_1.25m, ASS16_1.5m, ASS16_1.75m, ASS16_2.0m, ASS16_2.25m, ASS16_2.5m, ASS16_2.75m, ASS16_3.0m, ASS15_0m, ASS15_0.25m, ASS15_0.5m, ASS15_0.75m, ASS15_1.0m, ASS15_1.25m, ASS15_1.5m, QC15, ASS15_1.75m, ASS15_2.0m, ASS17_0m, ASS17_0.25m, ASS17_0.5m, ASS17_0.75m, ASS13_0m, ASS13_0.25m, ASS13_0.5m, ASS13_0.75m, ASS13_1.0m, ASS6_0m, ASS6_0.25m, ASS6_0.5m, ASS6_0.75m, ASS6_1.0m, ASS7_0m, ASS7_0.25m, ASS7_0.5m, ASS7_0.75m	**26-Jan-2022**	**03-Feb-2022**	25-Jul-2022	✓	**03-Feb-2022**	25-Jul-2022	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
QC13	**26-Jan-2022**	**----**	----	----	**02-Feb-2022**	09-Feb-2022	✓
Soil Glass Jar - Unpreserved (EA055)							
SS14_0m, SS14_1.0m, SS15_0m, SS15_0.5m, SS13_0m, SS13_0.5m, SS12_0m, SS12_0.5m	**26-Jan-2022**	**----**	----	----	**03-Feb-2022**	09-Feb-2022	✓
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Snap Lock Bag - ACM/Asbestos Grab Bag (EA200)							
SS15_0m, SS15_0.5m, QC13	**26-Jan-2022**	**----**	----	----	**02-Feb-2022**	25-Jul-2022	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
SS14_0m, SS14_1.0m, SS15_0m, SS15_0.5m, SS13_0m, SS13_0.5m, QC13, SS12_0m, SS12_0.5m	**26-Jan-2022**	**03-Feb-2022**	25-Jul-2022	✓	**04-Feb-2022**	25-Jul-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
SS14_0m,	SS14_1.0m,	**26-Jan-2022**	**03-Feb-2022**	23-Feb-2022	✓	**04-Feb-2022**	23-Feb-2022	✓
SS15_0m,	SS15_0.5m,							
SS13_0m,	SS13_0.5m,							
QC13,	SS12_0m,							
SS12_0.5m								
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066)								
SS14_0m,	SS14_1.0m,	**26-Jan-2022**	**01-Feb-2022**	09-Feb-2022	✓	**03-Feb-2022**	13-Mar-2022	✓
SS15_0m,	SS15_0.5m,							
SS13_0m,	SS13_0.5m,							
QC13								
Soil Glass Jar - Unpreserved (EP066)								
SS12_0m,	SS12_0.5m	**26-Jan-2022**	**03-Feb-2022**	09-Feb-2022	✓	**04-Feb-2022**	15-Mar-2022	✓
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
SS14_0m,	SS14_1.0m,	**26-Jan-2022**	**01-Feb-2022**	09-Feb-2022	✓	**03-Feb-2022**	13-Mar-2022	✓
SS15_0m,	SS15_0.5m,							
SS13_0m,	SS13_0.5m,							
QC13								
Soil Glass Jar - Unpreserved (EP068)								
SS12_0m,	SS12_0.5m	**26-Jan-2022**	**03-Feb-2022**	09-Feb-2022	✓	**04-Feb-2022**	15-Mar-2022	✓
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068)								
SS14_0m,	SS14_1.0m,	**26-Jan-2022**	**01-Feb-2022**	09-Feb-2022	✓	**03-Feb-2022**	13-Mar-2022	✓
SS15_0m,	SS15_0.5m,							
SS13_0m,	SS13_0.5m,							
QC13								
Soil Glass Jar - Unpreserved (EP068)								
SS12_0m,	SS12_0.5m	**26-Jan-2022**	**03-Feb-2022**	09-Feb-2022	✓	**04-Feb-2022**	15-Mar-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
SS14_0m,	SS14_1.0m,	**26-Jan-2022**	**01-Feb-2022**	09-Feb-2022	✓	**03-Feb-2022**	13-Mar-2022	✓
SS15_0m,	SS15_0.5m,							
SS13_0m,	SS13_0.5m,							
QC13								
Soil Glass Jar - Unpreserved (EP075(SIM))								
SS12_0m,	SS12_0.5m	**26-Jan-2022**	**03-Feb-2022**	09-Feb-2022	✓	**04-Feb-2022**	15-Mar-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP071)								
SS14_0m,	SS14_1.0m,	**26-Jan-2022**	**01-Feb-2022**	09-Feb-2022	✓	**03-Feb-2022**	13-Mar-2022	✓
SS15_0m,	SS15_0.5m,							
SS13_0m,	SS13_0.5m,							
QC13								
Soil Glass Jar - Unpreserved (EP080)								
SS14_0m,	SS14_1.0m,	**26-Jan-2022**	**02-Feb-2022**	09-Feb-2022	✓	**02-Feb-2022**	09-Feb-2022	✓
SS15_0m,	SS15_0.5m,							
SS13_0m,	SS13_0.5m,							
QC13								
Soil Glass Jar - Unpreserved (EP080)								
SS12_0m,	SS12_0.5m	**26-Jan-2022**	**03-Feb-2022**	09-Feb-2022	✓	**03-Feb-2022**	09-Feb-2022	✓
Soil Glass Jar - Unpreserved (EP071)								
SS12_0m,	SS12_0.5m	**26-Jan-2022**	**03-Feb-2022**	09-Feb-2022	✓	**04-Feb-2022**	15-Mar-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP071)								
SS14_0m,	SS14_1.0m,	**26-Jan-2022**	**01-Feb-2022**	09-Feb-2022	✓	**03-Feb-2022**	13-Mar-2022	✓
SS15_0m,	SS15_0.5m,							
SS13_0m,	SS13_0.5m,							
QC13								
Soil Glass Jar - Unpreserved (EP080)								
SS14_0m,	SS14_1.0m,	**26-Jan-2022**	**02-Feb-2022**	09-Feb-2022	✓	**02-Feb-2022**	09-Feb-2022	✓
SS15_0m,	SS15_0.5m,							
SS13_0m,	SS13_0.5m,							
QC13								
Soil Glass Jar - Unpreserved (EP080)								
SS12_0m,	SS12_0.5m	**26-Jan-2022**	**03-Feb-2022**	09-Feb-2022	✓	**03-Feb-2022**	09-Feb-2022	✓
Soil Glass Jar - Unpreserved (EP071)								
SS12_0m,	SS12_0.5m	**26-Jan-2022**	**03-Feb-2022**	09-Feb-2022	✓	**04-Feb-2022**	15-Mar-2022	✓
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
SS14_0m,	SS14_1.0m,	**26-Jan-2022**	**02-Feb-2022**	09-Feb-2022	✓	**02-Feb-2022**	09-Feb-2022	✓
SS15_0m,	SS15_0.5m,							
SS13_0m,	SS13_0.5m,							
QC13								
Soil Glass Jar - Unpreserved (EP080)								
SS12_0m,	SS12_0.5m	**26-Jan-2022**	**03-Feb-2022**	09-Feb-2022	✓	**03-Feb-2022**	09-Feb-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) SS14_0m, SS14_1.0m, SS15_0m, SS15_0.5m, SS13_0m, SS13_0.5m, QC13	**26-Jan-2022**	**01-Feb-2022**	25-Jul-2022	✓	**02-Feb-2022**	13-Mar-2022	✓
HDPE Soil Jar (EP231X) SS12_0m, SS12_0.5m	**26-Jan-2022**	**03-Feb-2022**	25-Jul-2022	✓	**03-Feb-2022**	15-Mar-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) SS14_0m, SS14_1.0m, SS15_0m, SS15_0.5m, SS13_0m, SS13_0.5m, QC13	**26-Jan-2022**	**01-Feb-2022**	25-Jul-2022	✓	**02-Feb-2022**	13-Mar-2022	✓
HDPE Soil Jar (EP231X) SS12_0m, SS12_0.5m	**26-Jan-2022**	**03-Feb-2022**	25-Jul-2022	✓	**03-Feb-2022**	15-Mar-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) SS14_0m, SS14_1.0m, SS15_0m, SS15_0.5m, SS13_0m, SS13_0.5m, QC13	**26-Jan-2022**	**01-Feb-2022**	25-Jul-2022	✓	**02-Feb-2022**	13-Mar-2022	✓
HDPE Soil Jar (EP231X) SS12_0m, SS12_0.5m	**26-Jan-2022**	**03-Feb-2022**	25-Jul-2022	✓	**03-Feb-2022**	15-Mar-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) SS14_0m, SS14_1.0m, SS15_0m, SS15_0.5m, SS13_0m, SS13_0.5m, QC13	**26-Jan-2022**	**01-Feb-2022**	25-Jul-2022	✓	**02-Feb-2022**	13-Mar-2022	✓
HDPE Soil Jar (EP231X) SS12_0m, SS12_0.5m	**26-Jan-2022**	**03-Feb-2022**	25-Jul-2022	✓	**03-Feb-2022**	15-Mar-2022	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) SS14_0m, SS14_1.0m, SS15_0m, SS15_0.5m, SS13_0m, SS13_0.5m, QC13	**26-Jan-2022**	**01-Feb-2022**	25-Jul-2022	✓	**02-Feb-2022**	13-Mar-2022	✓
HDPE Soil Jar (EP231X) SS12_0m, SS12_0.5m	**26-Jan-2022**	**03-Feb-2022**	25-Jul-2022	✓	**03-Feb-2022**	15-Mar-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP262: Ethanolamines							
Soil Glass Jar - Unpreserved (EP262) SS14_1.0m, SS15_0m	26-Jan-2022	----	----	----	01-Feb-2022	09-Feb-2022	✓
Soil Glass Jar - Unpreserved (EP262) SS14_0m, SS15_0.5m, SS13_0m, SS13_0.5m, QC13	26-Jan-2022	----	----	----	02-Feb-2022	09-Feb-2022	✓
Soil Glass Jar - Unpreserved (EP262) SS12_0m, SS12_0.5m	26-Jan-2022	----	----	----	03-Feb-2022	09-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T) QC17	26-Jan-2022	01-Feb-2022	25-Jul-2022	✓	01-Feb-2022	25-Jul-2022	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG035T) QC17	26-Jan-2022	----	----	----	01-Feb-2022	23-Feb-2022	✓
EP066: Polychlorinated Biphenyls (PCB)							
Amber Glass Bottle - Unpreserved (EP066) QC17	26-Jan-2022	01-Feb-2022	02-Feb-2022	✓	04-Feb-2022	13-Mar-2022	✓
EP068A: Organochlorine Pesticides (OC)							
Amber Glass Bottle - Unpreserved (EP068) QC17	26-Jan-2022	01-Feb-2022	02-Feb-2022	✓	04-Feb-2022	13-Mar-2022	✓
EP068B: Organophosphorus Pesticides (OP)							
Amber Glass Bottle - Unpreserved (EP068) QC17	26-Jan-2022	01-Feb-2022	02-Feb-2022	✓	04-Feb-2022	13-Mar-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) QC17	26-Jan-2022	01-Feb-2022	02-Feb-2022	✓	04-Feb-2022	13-Mar-2022	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) QC17, QC18	26-Jan-2022	01-Feb-2022	02-Feb-2022	✓	04-Feb-2022	13-Mar-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC17, QC18	26-Jan-2022	02-Feb-2022	09-Feb-2022	✓	02-Feb-2022	09-Feb-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) QC17, QC18	26-Jan-2022	01-Feb-2022	02-Feb-2022	✓	04-Feb-2022	13-Mar-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC17, QC18	26-Jan-2022	02-Feb-2022	09-Feb-2022	✓	02-Feb-2022	09-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) QC17, QC18	**26-Jan-2022**	**02-Feb-2022**	09-Feb-2022	✓	**02-Feb-2022**	09-Feb-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) QC17	**26-Jan-2022**	**03-Feb-2022**	25-Jul-2022	✓	**03-Feb-2022**	25-Jul-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) QC17	**26-Jan-2022**	**03-Feb-2022**	25-Jul-2022	✓	**03-Feb-2022**	25-Jul-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) QC17	**26-Jan-2022**	**03-Feb-2022**	25-Jul-2022	✓	**03-Feb-2022**	25-Jul-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) QC17	**26-Jan-2022**	**03-Feb-2022**	25-Jul-2022	✓	**03-Feb-2022**	25-Jul-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) QC17	**26-Jan-2022**	**03-Feb-2022**	25-Jul-2022	✓	**03-Feb-2022**	25-Jul-2022	✓
EP262: Ethanolamines							
Amber Bottle Unpreserved for Specialist Organics (EP262) QC17	**26-Jan-2022**	**----**	----	----	**02-Feb-2022**	02-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	5	41	12.20	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	3	18	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	3	15	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	33	12.12	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	3	15	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	3	15	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	3	15	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	15	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Matrix Spikes (MS) - Continued							
TRH Volatiles/BTEX	EP080	2	15	13.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Ethanolamines by LCMSMS	EP262	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	1	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	1	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	1	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	2	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ethanolamines by LCMSMS	EP262	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ethanolamines by LCMSMS	EP262	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	50.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ethanolamines by LCMSMS	EP262	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	1	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	1	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Polychlorinated Biphenyls (PCB)	EP066	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	2	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines in Soils	EP262	SOIL	In House: 2g of soil is extracted into 10 mL of water then analysed by analysed by LC/MSMS in ESI Positive Mode.

Analytical Methods	Method	Matrix	Method Descriptions
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines by LCMSMS	EP262	WATER	In house: LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.

Preparation Methods	Method	Matrix	Method Descriptions
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201074**	Page	: 1 of 42
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman PSI	Date Samples Received	: 01-Feb-2022 11:50
Order number	: ----	Date Analysis Commenced	: 02-Feb-2022
C-O-C number	: ----	Issue Date	: 08-Feb-2022 18:02
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 54		
No. of samples analysed	: 45		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Uyen Dalkin	Approved Asbestos Identifier	Melbourne Asbestos, Springvale, VIC
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EA200 conducted by ALS Melbourne, NATA accreditation no. 825, site no 13778
- EP231X and EP262 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X: Poor matrix recovery has been detected for particular compounds due to sample matrix effects.
- EP262: Poor matrix spike recovery for particular compounds due to matrix interferences.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EP262: ALS is not NATA accredited for the analysis of MDEA.
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)

- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS19_0	SS19_0.5	ASS21_0	ASS21_0.25	SS11_0
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-001	EP2201074-002	EP2201074-006	EP2201074-007	EP2201074-008
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	----	----	8.1	8.2	----
pH (Fox)	----	0.1	pH Unit	----	----	7.0	7.0	----
Reaction Rate	----	1	-	----	----	Moderate	Moderate	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	----	----	----	----	6.8
Moisture Content	----	1.0	%	3.1	6.5	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	----	----	No
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	----	----	No
Asbestos Type	1332-21-4	-	--	-	-	----	----	-
Sample weight (dry)	----	0.01	g	17.5	25.4	----	----	27.7
APPROVED IDENTIFIER:	----	-	--	U.DALKIN	U.DALKIN	----	----	U.DALKIN
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	----	----	No
Organic Fibre	----	0.1	g/kg	Yes	Yes	----	----	Yes
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	6	8	----	----	7
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	<1
Chromium	7440-47-3	2	mg/kg	37	35	----	----	30
Copper	7440-50-8	5	mg/kg	12	17	----	----	13
Lead	7439-92-1	5	mg/kg	8	10	----	----	6
Nickel	7440-02-0	2	mg/kg	26	47	----	----	17
Zinc	7440-66-6	5	mg/kg	26	37	----	----	22
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	----	----	----	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	----	----	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	----	----	----	----	<0.5
Fluorene	86-73-7	0.5	mg/kg	----	----	----	----	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	----	----	----	----	<0.5
Anthracene	120-12-7	0.5	mg/kg	----	----	----	----	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	----	----	----	----	<0.5
Pyrene	129-00-0	0.5	mg/kg	----	----	----	----	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	----	----	----	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS19_0	SS19_0.5	ASS21_0	ASS21_0.25	SS11_0
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-001	EP2201074-002	EP2201074-006	EP2201074-007	EP2201074-008
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Chrysene	218-01-9	0.5	mg/kg	----	----	----	----	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	----	----	----	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	----	----	----	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	----	----	----	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	----	----	----	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	----	----	----	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	----	----	----	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	----	----	----	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	----	----	----	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	----	----	----	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	----	----	----	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	----	----	----	<10
C10 - C14 Fraction	----	50	mg/kg	----	----	----	----	<50
C15 - C28 Fraction	----	100	mg/kg	----	----	----	----	<100
C29 - C36 Fraction	----	100	mg/kg	----	----	----	----	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	----	----	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	----	----	----	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	----	----	----	<10
>C10 - C16 Fraction	----	50	mg/kg	----	----	----	----	<50
>C16 - C34 Fraction	----	100	mg/kg	----	----	----	----	<100
>C34 - C40 Fraction	----	100	mg/kg	----	----	----	----	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	----	----	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	----	----	----	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	----	----	----	<0.2
Toluene	108-88-3	0.5	mg/kg	----	----	----	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	----	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	----	<0.5
^ Sum of BTEX	----	0.2	mg/kg	----	----	----	----	<0.2
^ Total Xylenes	----	0.5	mg/kg	----	----	----	----	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS19_0	SS19_0.5	ASS21_0	ASS21_0.25	SS11_0
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-001	EP2201074-002	EP2201074-006	EP2201074-007	EP2201074-008
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
Naphthalene	91-20-3	1	mg/kg	----	----	----	----	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	----	----	----	----	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	----	----	----	----	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	----	----	----	----	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	----	----	----	----	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	----	----	----	----	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS19_0	SS19_0.5	ASS21_0	ASS21_0.25	SS11_0
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-001	EP2201074-002	EP2201074-006	EP2201074-007	EP2201074-008
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	----	----	----	----	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	----	----	----	----	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	----	----	----	----	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	----	----	----	----	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	----	----	----	----	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	----	----	----	----	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	----	----	----	----	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	----	----	----	----	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	----	----	----	----	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	----	----	----	----	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	----	----	----	----	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	----	----	----	----	<0.0002
EP262: Ethanolamines								
Ethanolamine	141-43-5	10	mg/kg	----	----	----	----	<10
Diethanolamine	111-42-2	10	mg/kg	----	----	----	----	<10
Methyl diethanolamine (MDEA)	105-59-9	10	mg/kg	----	----	----	----	<10
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	----	----	----	----	**66.9**
2-Chlorophenol-D4	93951-73-6	0.5	%	----	----	----	----	**72.4**
2.4.6-Tribromophenol	118-79-6	0.5	%	----	----	----	----	**67.8**
EP075(SIM)T: PAH Surrogates								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS19_0	SS19_0.5	ASS21_0	ASS21_0.25	SS11_0
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-001	EP2201074-002	EP2201074-006	EP2201074-007	EP2201074-008
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
2-Fluorobiphenyl	321-60-8	0.5	%	----	----	----	----	98.8
Anthracene-d10	1719-06-8	0.5	%	----	----	----	----	89.7
4-Terphenyl-d14	1718-51-0	0.5	%	----	----	----	----	99.0
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	----	----	----	87.6
Toluene-D8	2037-26-5	0.2	%	----	----	----	----	96.1
4-Bromofluorobenzene	460-00-4	0.2	%	----	----	----	----	93.0
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	----	----	----	----	95.0
13C8-PFOA	----	0.0002	%	----	----	----	----	102

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS11_0.5	ASS1_0	ASS1_0.25	ASS1_0.5	ASS1_0.75
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-009	EP2201074-012	EP2201074-013	EP2201074-014	EP2201074-015
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	----	8.5	8.8	9.1	9.3
pH (Fox)	----	0.1	pH Unit	----	6.9	7.0	7.0	7.0
Reaction Rate	----	1	-	----	Moderate	Moderate	Moderate	Moderate
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	6.8	----	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	----	----	----	----
Asbestos (Trace)	1332-21-4	5	Fibres	No	----	----	----	----
Asbestos Type	1332-21-4	-	--	-	----	----	----	----
Sample weight (dry)	----	0.01	g	27.5	----	----	----	----
APPROVED IDENTIFIER:	----	-	--	U.DALKIN	----	----	----	----
Synthetic Mineral Fibre	----	0.1	g/kg	No	----	----	----	----
Organic Fibre	----	0.1	g/kg	Yes	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	8	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	34	----	----	----	----
Copper	7440-50-8	5	mg/kg	14	----	----	----	----
Lead	7439-92-1	5	mg/kg	6	----	----	----	----
Nickel	7440-02-0	2	mg/kg	20	----	----	----	----
Zinc	7440-66-6	5	mg/kg	27	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS11_0.5	ASS1_0	ASS1_0.25	ASS1_0.5	ASS1_0.75
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-009	EP2201074-012	EP2201074-013	EP2201074-014	EP2201074-015
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	----	----	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS11_0.5	ASS1_0	ASS1_0.25	ASS1_0.5	ASS1_0.75
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-009	EP2201074-012	EP2201074-013	EP2201074-014	EP2201074-015
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS11_0.5	ASS1_0	ASS1_0.25	ASS1_0.5	ASS1_0.75
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-009	EP2201074-012	EP2201074-013	EP2201074-014	EP2201074-015
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	----	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	----	----	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	10	mg/kg	<10	----	----	----	----
Diethanolamine	111-42-2	10	mg/kg	<10	----	----	----	----
Methyl diethanolamine (MDEA)	105-59-9	10	mg/kg	<10	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**78.6**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**78.0**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**63.3**	----	----	----	----
EP075(SIM)T: PAH Surrogates								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS11_0.5	ASS1_0	ASS1_0.25	ASS1_0.5	ASS1_0.75
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-009	EP2201074-012	EP2201074-013	EP2201074-014	EP2201074-015
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
2-Fluorobiphenyl	321-60-8	0.5	%	98.6	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%	87.8	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	97.1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	76.4	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	85.0	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	82.4	----	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	106	----	----	----	----
13C8-PFOA	----	0.0002	%	102	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS1_1.0	ASS1_1.25	ASS1_1.50	ASS1_1.75	ASS1_2.00
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-016	EP2201074-017	EP2201074-018	EP2201074-019	EP2201074-020
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**9.4**	**9.2**	**9.9**	**9.2**	**9.1**
pH (Fox)	----	0.1	pH Unit	**7.0**	**7.2**	**8.5**	**8.7**	**8.6**
Reaction Rate	----	1	-	**Moderate**	**Moderate**	**Moderate**	**Strong**	**Strong**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS1_2.25	ASS1_2.50	ASS1_2.75	ASS1_3.00	ASS2_0
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-021	EP2201074-022	EP2201074-023	EP2201074-024	EP2201074-025
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**9.2**	**8.6**	**9.2**	**8.7**	**9.1**
pH (Fox)	----	0.1	pH Unit	**8.0**	**7.6**	**7.1**	**7.1**	**7.8**
Reaction Rate	----	1	-	**Strong**	**Strong**	**Strong**	**Strong**	**Strong**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS2_0.25	ASS3_0	ASS3_0.25	ASS3_0.50	ASS3_0.75
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-026	EP2201074-027	EP2201074-028	EP2201074-029	EP2201074-030
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**9.4**	**8.8**	**8.2**	**8.4**	**8.8**
pH (Fox)	----	0.1	pH Unit	**7.2**	**8.0**	**7.6**	**8.2**	**7.6**
Reaction Rate	----	1	-	**Extreme**	**Extreme**	**Extreme**	**Extreme**	**Extreme**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS3_0.90	SS9_0	SS9_1.0	ASS4_0	ASS4_0.25
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-031	EP2201074-032	EP2201074-034	EP2201074-036	EP2201074-037
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	8.8	----	----	9.1	9.2
pH (Fox)	----	0.1	pH Unit	8.3	----	----	8.0	7.8
Reaction Rate	----	1	-	Extreme	----	----	Extreme	Extreme
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	----	2.9	----	----	----
Moisture Content	----	1.0	%	----	----	3.5	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	----	No	----	----	----
Asbestos (Trace)	1332-21-4	5	Fibres	----	No	----	----	----
Asbestos Type	1332-21-4	-	--	----	-	----	----	----
Sample weight (dry)	----	0.01	g	----	21.1	----	----	----
APPROVED IDENTIFIER:	----	-	--	----	U.DALKIN	----	----	----
Synthetic Mineral Fibre	----	0.1	g/kg	----	No	----	----	----
Organic Fibre	----	0.1	g/kg	----	Yes	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	<5	<5	----	----
Cadmium	7440-43-9	1	mg/kg	----	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg	----	40	57	----	----
Copper	7440-50-8	5	mg/kg	----	17	16	----	----
Lead	7439-92-1	5	mg/kg	----	6	6	----	----
Nickel	7440-02-0	2	mg/kg	----	21	34	----	----
Zinc	7440-66-6	5	mg/kg	----	22	35	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	<0.1	<0.1	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	<0.1	<0.1	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	----	<0.05	<0.05	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	----	<0.05	<0.05	----	----
beta-BHC	319-85-7	0.05	mg/kg	----	<0.05	<0.05	----	----
gamma-BHC	58-89-9	0.05	mg/kg	----	<0.05	<0.05	----	----
delta-BHC	319-86-8	0.05	mg/kg	----	<0.05	<0.05	----	----
Heptachlor	76-44-8	0.05	mg/kg	----	<0.05	<0.05	----	----
Aldrin	309-00-2	0.05	mg/kg	----	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS3_0.90	SS9_0	SS9_1.0	ASS4_0	ASS4_0.25
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-031	EP2201074-032	EP2201074-034	EP2201074-036	EP2201074-037
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	<0.05	<0.05	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	----	<0.05	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	----	<0.05	<0.05	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	<0.05	<0.05	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	----	<0.05	<0.05	----	----
Dieldrin	60-57-1	0.05	mg/kg	----	<0.05	<0.05	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	----	<0.05	<0.05	----	----
Endrin	72-20-8	0.05	mg/kg	----	<0.05	<0.05	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	----	<0.05	<0.05	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	----	<0.05	<0.05	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	----	<0.05	<0.05	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	----	<0.05	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	----	<0.05	<0.05	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	----	<0.2	<0.2	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	----	<0.05	<0.05	----	----
Methoxychlor	72-43-5	0.2	mg/kg	----	<0.2	<0.2	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	----	<0.05	<0.05	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	----	<0.05	<0.05	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	----	<0.05	<0.05	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	----	<0.05	<0.05	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	----	<0.2	<0.2	----	----
Dimethoate	60-51-5	0.05	mg/kg	----	<0.05	<0.05	----	----
Diazinon	333-41-5	0.05	mg/kg	----	<0.05	<0.05	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	----	<0.05	<0.05	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	----	<0.2	<0.2	----	----
Malathion	121-75-5	0.05	mg/kg	----	<0.05	<0.05	----	----
Fenthion	55-38-9	0.05	mg/kg	----	<0.05	<0.05	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	<0.05	<0.05	----	----
Parathion	56-38-2	0.2	mg/kg	----	<0.2	<0.2	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	----	<0.05	<0.05	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	----	<0.05	<0.05	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	----	<0.05	<0.05	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	----	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS3_0.90	SS9_0	SS9_1.0	ASS4_0	ASS4_0.25
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-031	EP2201074-032	EP2201074-034	EP2201074-036	EP2201074-037
				Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued								
Prothiofos	34643-46-4	0.05	mg/kg	----	<0.05	<0.05	----	----
Ethion	563-12-2	0.05	mg/kg	----	<0.05	<0.05	----	----
Carbophenothion	786-19-6	0.05	mg/kg	----	<0.05	<0.05	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	----	<0.05	<0.05	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	----	<0.5	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg	----	<0.5	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg	----	<0.5	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg	----	<0.5	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg	----	<0.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg	----	<0.5	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg	----	<0.5	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	<0.5	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg	----	<0.5	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	<0.5	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	<0.5	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	<0.5	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	<0.5	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	**0.6**	**0.6**	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	**1.2**	**1.2**	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	<10	<10	----	----
C10 - C14 Fraction	----	50	mg/kg	----	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg	----	<100	<100	----	----
C29 - C36 Fraction	----	100	mg/kg	----	<100	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	<10	<10	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS3_0.90	SS9_0	SS9_1.0	ASS4_0	ASS4_0.25
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-031	EP2201074-032	EP2201074-034	EP2201074-036	EP2201074-037
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	<10	<10	----	----
>C10 - C16 Fraction	----	50	mg/kg	----	<50	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg	----	<100	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg	----	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	<50	<50	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	<50	<50	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg	----	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	----	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	<0.5	----	----
^ Sum of BTEX	----	0.2	mg/kg	----	<0.2	<0.2	----	----
^ Total Xylenes	----	0.5	mg/kg	----	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg	----	<1	<1	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	----	<0.001	<0.001	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	----	<0.0002	<0.0002	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS3_0.90	SS9_0	SS9_1.0	ASS4_0	ASS4_0.25
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-031	EP2201074-032	EP2201074-034	EP2201074-036	EP2201074-037
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	----	<0.0005	<0.0005	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	----	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	----	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	----	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	----	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	----	<0.0005	<0.0005	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	----	<0.0005	<0.0005	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	----	<0.0005	<0.0005	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS3_0.90	SS9_0	SS9_1.0	ASS4_0	ASS4_0.25
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-031	EP2201074-032	EP2201074-034	EP2201074-036	EP2201074-037
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	----	<0.0005	<0.0005	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	----	<0.0002	<0.0002	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	----	96.9	88.2	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	----	87.2	98.9	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	----	70.6	59.5	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	----	74.3	94.5	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	----	74.2	88.5	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	----	69.7	78.6	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	----	95.0	114	----	----
Anthracene-d10	1719-06-8	0.5	%	----	81.1	103	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	----	95.6	126	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	78.8	72.0	----	----
Toluene-D8	2037-26-5	0.2	%	----	91.2	84.8	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	----	85.9	80.9	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	----	102	95.5	----	----
13C8-PFOA	----	0.0002	%	----	108	101	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS4_0.50	ASS4_0.75	ASS4_1.0	ASS4_1.25	ASS5_0
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-038	EP2201074-039	EP2201074-040	EP2201074-041	EP2201074-042
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.4**	**8.1**	**8.7**	**8.3**	**8.4**
pH (Fox)	----	0.1	pH Unit	**7.4**	**7.7**	**8.5**	**8.0**	**6.9**
Reaction Rate	----	1	-	**Extreme**	**Extreme**	**Extreme**	**Extreme**	**Extreme**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS5_0.25	ASS5_0.50	ASS5_0.75	ASS5_0.90	QC21
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-043	EP2201074-044	EP2201074-045	EP2201074-046	EP2201074-047
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	8.4	8.4	8.1	8.3	----
pH (Fox)	----	0.1	pH Unit	6.4	6.9	7.1	7.7	----
Reaction Rate	----	1	-	Extreme	Extreme	Extreme	Extreme	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	----	----	----	----	8.8
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	----	----	----	10
Cadmium	7440-43-9	1	mg/kg	----	----	----	----	<1
Chromium	7440-47-3	2	mg/kg	----	----	----	----	32
Copper	7440-50-8	5	mg/kg	----	----	----	----	13
Lead	7439-92-1	5	mg/kg	----	----	----	----	7
Nickel	7440-02-0	2	mg/kg	----	----	----	----	16
Zinc	7440-66-6	5	mg/kg	----	----	----	----	25
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	----	----	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	----	----	----	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	----	----	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	----	----	----	----	<0.5
Fluorene	86-73-7	0.5	mg/kg	----	----	----	----	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	----	----	----	----	<0.5
Anthracene	120-12-7	0.5	mg/kg	----	----	----	----	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	----	----	----	----	<0.5
Pyrene	129-00-0	0.5	mg/kg	----	----	----	----	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	----	----	----	<0.5
Chrysene	218-01-9	0.5	mg/kg	----	----	----	----	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	----	----	----	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	----	----	----	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	----	----	----	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	----	----	----	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	----	----	----	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	----	----	----	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	----	----	----	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	----	----	----	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS5_0.25	ASS5_0.50	ASS5_0.75	ASS5_0.90	QC21
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-043	EP2201074-044	EP2201074-045	EP2201074-046	EP2201074-047
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	----	----	----	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	----	----	----	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	----	----	----	<10
C10 - C14 Fraction	----	50	mg/kg	----	----	----	----	<50
C15 - C28 Fraction	----	100	mg/kg	----	----	----	----	<100
C29 - C36 Fraction	----	100	mg/kg	----	----	----	----	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	----	----	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	----	----	----	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	----	----	----	<10
>C10 - C16 Fraction	----	50	mg/kg	----	----	----	----	<50
>C16 - C34 Fraction	----	100	mg/kg	----	----	----	----	<100
>C34 - C40 Fraction	----	100	mg/kg	----	----	----	----	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	----	----	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	----	----	----	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	----	----	----	<0.2
Toluene	108-88-3	0.5	mg/kg	----	----	----	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	----	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	----	<0.5
^ Sum of BTEX	----	0.2	mg/kg	----	----	----	----	<0.2
^ Total Xylenes	----	0.5	mg/kg	----	----	----	----	<0.5
Naphthalene	91-20-3	1	mg/kg	----	----	----	----	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	----	----	----	----	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS5_0.25	ASS5_0.50	ASS5_0.75	ASS5_0.90	QC21
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-043	EP2201074-044	EP2201074-045	EP2201074-046	EP2201074-047
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	----	----	----	----	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	----	----	----	----	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	----	----	----	----	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	----	----	----	----	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	----	----	----	----	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	----	----	----	----	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	----	----	----	----	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	----	----	----	----	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	----	----	----	----	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS5_0.25	ASS5_0.50	ASS5_0.75	ASS5_0.90	QC21
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-043	EP2201074-044	EP2201074-045	EP2201074-046	EP2201074-047
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	----	----	----	----	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	----	----	----	----	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	----	----	----	----	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	----	----	----	----	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	----	----	----	----	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	----	----	----	----	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	----	----	----	----	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	----	----	----	----	<0.0002
EP262: Ethanolamines								
Ethanolamine	141-43-5	10	mg/kg	----	----	----	----	<10
Diethanolamine	111-42-2	10	mg/kg	----	----	----	----	<10
Methyl diethanolamine (MDEA)	105-59-9	10	mg/kg	----	----	----	----	<10
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	----	----	----	----	**89.6**
2-Chlorophenol-D4	93951-73-6	0.5	%	----	----	----	----	**78.5**
2.4.6-Tribromophenol	118-79-6	0.5	%	----	----	----	----	**90.6**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	----	----	----	----	**118**
Anthracene-d10	1719-06-8	0.5	%	----	----	----	----	**105**
4-Terphenyl-d14	1718-51-0	0.5	%	----	----	----	----	**111**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	----	----	----	**77.1**
Toluene-D8	2037-26-5	0.2	%	----	----	----	----	**89.1**
4-Bromofluorobenzene	460-00-4	0.2	%	----	----	----	----	**83.8**
EP231S: PFAS Surrogate								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS5_0.25	ASS5_0.50	ASS5_0.75	ASS5_0.90	QC21
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201074-043	EP2201074-044	EP2201074-045	EP2201074-046	EP2201074-047
				Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued								
13C4-PFOS	----	0.0002	%	----	----	----	----	104
13C8-PFOA	----	0.0002	%	----	----	----	----	108

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC23	QC25	QC28	----	----
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2201074-048	EP2201074-049	EP2201074-051	--------	--------
				Result	Result	Result	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	----	----	8.6	----	----
pH (Fox)	----	0.1	pH Unit	----	----	7.2	----	----
Reaction Rate	----	1	-	----	----	Extreme	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	15.2	4.2	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	10	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	53	39	----	----	----
Copper	7440-50-8	5	mg/kg	20	16	----	----	----
Lead	7439-92-1	5	mg/kg	8	6	----	----	----
Nickel	7440-02-0	2	mg/kg	30	21	----	----	----
Zinc	7440-66-6	5	mg/kg	23	22	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	<0.1	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	----	<0.05	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	----	<0.05	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	----	<0.05	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	----	<0.05	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	----	<0.05	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	----	<0.05	----	----	----
Aldrin	309-00-2	0.05	mg/kg	----	<0.05	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	<0.05	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	----	<0.05	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	----	<0.05	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	<0.05	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	----	<0.05	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	----	<0.05	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	----	<0.05	----	----	----
Endrin	72-20-8	0.05	mg/kg	----	<0.05	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	----	<0.05	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC23	QC25	QC28	----	----
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2201074-048	EP2201074-049	EP2201074-051	--------	--------
				Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	----	<0.05	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	----	<0.05	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	----	<0.05	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	----	<0.05	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	----	<0.2	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	----	<0.05	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg	----	<0.2	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	----	<0.05	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	----	<0.05	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	----	<0.05	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	----	<0.05	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	----	<0.2	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	----	<0.05	----	----	----
Diazinon	333-41-5	0.05	mg/kg	----	<0.05	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	----	<0.05	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	----	<0.2	----	----	----
Malathion	121-75-5	0.05	mg/kg	----	<0.05	----	----	----
Fenthion	55-38-9	0.05	mg/kg	----	<0.05	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	<0.05	----	----	----
Parathion	56-38-2	0.2	mg/kg	----	<0.2	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	----	<0.05	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	----	<0.05	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	----	<0.05	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	----	<0.05	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg	----	<0.05	----	----	----
Ethion	563-12-2	0.05	mg/kg	----	<0.05	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg	----	<0.05	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	----	<0.05	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC23	QC25	QC28	----	----
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2201074-048	EP2201074-049	EP2201074-051	--------	--------
				Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC23	QC25	QC28	----	----
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2201074-048	EP2201074-049	EP2201074-051	--------	--------
				Result	Result	Result	----	----
EP080: BTEXN - Continued								
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	----	----	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC23	QC25	QC28	----	----
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2201074-048	EP2201074-049	EP2201074-051	--------	--------
				Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	10	mg/kg	<10	----	----	----	----
Diethanolamine	111-42-2	10	mg/kg	<10	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC23	QC25	QC28	----	----
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	28-Jan-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2201074-048	EP2201074-049	EP2201074-051	--------	--------
				Result	Result	Result	----	----
EP262: Ethanolamines - Continued								
Methyl diethanolamine (MDEA)	105-59-9	10	mg/kg	<10	----	----	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	----	92.2	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	----	101	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	----	57.8	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	83.1	85.7	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	74.9	79.8	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	84.4	81.3	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	110	118	----	----	----
Anthracene-d10	1719-06-8	0.5	%	94.9	101	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	104	113	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	77.6	76.3	----	----	----
Toluene-D8	2037-26-5	0.2	%	86.1	87.0	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	77.9	81.5	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	107	104	----	----	----
13C8-PFOA	----	0.0002	%	100	102	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC30	QC31	----	----	----
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201074-053	EP2201074-054	--------	--------	--------
				Result	Result	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	----	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	----	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	----	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	----	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	----	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	----	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L	----	<0.005	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	----	<0.0001	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	----	<1	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	----	<0.5	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	----	<0.5	----	----	----
beta-BHC	319-85-7	0.5	µg/L	----	<0.5	----	----	----
gamma-BHC	58-89-9	0.5	µg/L	----	<0.5	----	----	----
delta-BHC	319-86-8	0.5	µg/L	----	<0.5	----	----	----
Heptachlor	76-44-8	0.5	µg/L	----	<0.5	----	----	----
Aldrin	309-00-2	0.5	µg/L	----	<0.5	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	----	<0.5	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L	----	<0.5	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L	----	<0.5	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L	----	<0.5	----	----	----
Dieldrin	60-57-1	0.5	µg/L	----	<0.5	----	----	----
4.4`-DDE	72-55-9	0.5	µg/L	----	<0.5	----	----	----
Endrin	72-20-8	0.5	µg/L	----	<0.5	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L	----	<0.5	----	----	----
4.4`-DDD	72-54-8	0.5	µg/L	----	<0.5	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	----	<0.5	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	----	<0.5	----	----	----
4.4`-DDT	50-29-3	2.0	µg/L	----	<2.0	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L	----	<0.5	----	----	----
Methoxychlor	72-43-5	2.0	µg/L	----	<2.0	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	----	<0.5	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC30	QC31	----	----	----
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201074-053	EP2201074-054	--------	--------	--------
				Result	Result	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	----	<0.5	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	----	<0.5	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	----	<0.5	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	----	<0.5	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L	----	<2.0	----	----	----
Dimethoate	60-51-5	0.5	µg/L	----	<0.5	----	----	----
Diazinon	333-41-5	0.5	µg/L	----	<0.5	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	----	<0.5	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L	----	<2.0	----	----	----
Malathion	121-75-5	0.5	µg/L	----	<0.5	----	----	----
Fenthion	55-38-9	0.5	µg/L	----	<0.5	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	----	<0.5	----	----	----
Parathion	56-38-2	2.0	µg/L	----	<2.0	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	----	<0.5	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	----	<0.5	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	----	<0.5	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	----	<0.5	----	----	----
Prothiofos	34643-46-4	0.5	µg/L	----	<0.5	----	----	----
Ethion	563-12-2	0.5	µg/L	----	<0.5	----	----	----
Carbophenothion	786-19-6	0.5	µg/L	----	<0.5	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	----	<0.5	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	----	<1.0	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	----	<1.0	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	----	<1.0	----	----	----
Fluorene	86-73-7	1.0	µg/L	----	<1.0	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	----	<1.0	----	----	----
Anthracene	120-12-7	1.0	µg/L	----	<1.0	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	----	<1.0	----	----	----
Pyrene	129-00-0	1.0	µg/L	----	<1.0	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	----	<1.0	----	----	----
Chrysene	218-01-9	1.0	µg/L	----	<1.0	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	----	<1.0	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC30	QC31	----	----	----
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201074-053	EP2201074-054	--------	--------	--------
				Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	----	<1.0	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	----	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	----	<1.0	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	----	<1.0	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	----	<1.0	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	----	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	----	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC30	QC31	----	----	----
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201074-053	EP2201074-054	--------	--------	--------
				Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	----	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	----	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	----	<0.01	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	----	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	----	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	----	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	----	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	----	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	----	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	----	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	----	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	----	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	----	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	----	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	----	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	----	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	----	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	----	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	----	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	----	<0.05	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC30	QC31	----	----	----
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201074-053	EP2201074-054	--------	--------	--------
				Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	----	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	----	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	----	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	----	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	----	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	----	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	----	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	----	<0.05	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	----	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	----	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	----	<0.01	----	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	----	<1	----	----	----
Diethanolamine	111-42-2	1	µg/L	----	<1	----	----	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	----	<1	----	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	1	%	----	**65.0**	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	----	**55.9**	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	----	**51.5**	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC30	QC31	----	----	----
			Sampling date / time	28-Jan-2022 00:00	28-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201074-053	EP2201074-054	--------	--------	--------
				Result	Result	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates - Continued								
Phenol-d6	13127-88-3	1.0	%	----	12.4	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	----	40.0	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	----	27.6	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	----	43.1	----	----	----
Anthracene-d10	1719-06-8	1.0	%	----	54.4	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	----	65.7	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	83.5	82.1	----	----	----
Toluene-D8	2037-26-5	2	%	98.9	100	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	105	102	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	----	101	----	----	----
13C8-PFOA	----	0.02	%	----	104	----	----	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	SS19_0 - 28-Jan-2022 00:00	Brown red soil with rock and organic matter.
EA200: Description	SS19_0.5 - 28-Jan-2022 00:00	Tan soil with rock and organic matter.
EA200: Description	SS11_0 - 28-Jan-2022 00:00	Brown orange soil with rock and organic matter.
EA200: Description	SS11_0.5 - 28-Jan-2022 00:00	Brown orange soil with rock and organic matter.
EA200: Description	SS9_0 - 28-Jan-2022 00:00	Orange soil with rock and organic matter.

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	43	119
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	53	152
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	28	152
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	57	119
2-Chlorophenol-D4	93951-73-6	52	130
2.4.6-Tribromophenol	118-79-6	40	132
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	53	139
Anthracene-d10	1719-06-8	68	124
4-Terphenyl-d14	1718-51-0	66	132
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	63	132
Toluene-D8	2037-26-5	66	125
4-Bromofluorobenzene	460-00-4	60	124
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	27	136
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	50	146
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	27	153
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	67
2-Chlorophenol-D4	93951-73-6	29	120
2.4.6-Tribromophenol	118-79-6	10	131
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	34	131
Anthracene-d10	1719-06-8	43	126
4-Terphenyl-d14	1718-51-0	41	142

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Melbourne, NATA accreditation no. 825, site no. 13778 (Chemistry).

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EP262: Ethanolamines

(WATER) EP262: Ethanolamines

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2201074**	Page	: 1 of 19
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman PSI	Date Samples Received	: 01-Feb-2022
Order number	: ----	Date Analysis Commenced	: 02-Feb-2022
C-O-C number	: ----	Issue Date	: 08-Feb-2022
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 54		
No. of samples analysed	: 45		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Uyen Dalkin	Approved Asbestos Identifier	Melbourne Asbestos, Springvale, VIC
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4152608)									
EP2201008-043	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	24	22	4.7	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	9	9	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	8	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	5	5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	10	10	0.0	No Limit
EP2201074-002	SS19_0.5	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	35	38	6.5	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	47	43	9.5	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	8	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	17	16	9.6	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	9	18.7	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	37	36	3.4	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 4152498)									
EP2201074-006	ASS21_0	EA037: pH (F)	----	0.1	pH Unit	8.1	8.2	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	7.0	7.0	0.0	0% - 20%
EP2201074-019	ASS1_1.75	EA037: pH (F)	----	0.1	pH Unit	9.2	9.3	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	8.7	8.7	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 4152499)									
EP2201074-030	ASS3_0.75	EA037: pH (F)	----	0.1	pH Unit	8.8	8.9	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	7.6	7.6	0.0	0% - 20%
EP2201074-043	ASS5_0.25	EA037: pH (F)	----	0.1	pH Unit	8.4	8.3	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.4	6.4	0.0	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4152602)									
EP2201008-043	Anonymous	EA055: Moisture Content	----	0.1	%	26.4	28.1	6.0	0% - 20%
EP2201074-002	SS19_0.5	EA055: Moisture Content	----	0.1	%	6.5	6.4	1.7	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4152607)									
EP2201008-043	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP2201074-002	SS19_0.5	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 4149788)									
EP2201074-032	SS9_0	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4149787)									
EP2201074-032	SS9_0	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4149787)									
EP2201074-032	SS9_0	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4149787) - continued									
EP2201074-032	SS9_0	EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4149786)									
EP2201074-032	SS9_0	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4149785)									
EP2201007-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP2201074-032	SS9_0	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4149789)									
EP2201007-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP2201074-032	SS9_0	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4149785)									
EP2201007-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP2201074-032	SS9_0	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4149789)									
EP2201007-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP2201074-032	SS9_0	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080: BTEXN (QC Lot: 4149789)									
EP2201007-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EP2201074-032	SS9_0	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4151083)									
EP2201074-008	SS11_0	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4151083)									
EP2201074-008	SS11_0	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4151083) - continued									
EP2201074-008	SS11_0	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4151083)									
EP2201074-008	SS11_0	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4151083)									
EP2201074-008	SS11_0	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 4149924)									
EP2200982-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0004	0.0005	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.010	0.010	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 4149924) - continued									
EP2201080-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.028	0.028	0.0	0% - 20%
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.010	0.009	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4149955)									
EP2201050-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EP2201100-003	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4150370)									
EP2200904-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4150370)									
EP2200904-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 4150370)									
EP2200904-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4150953)									
ES2203533-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.16	0.16	0.0	0% - 50%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	1.27	1.27	0.0	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4150953)									
ES2203533-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.10	0.10	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4150953) - continued									
ES2203533-001	Anonymous	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4150953)									
ES2203533-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4150953)									
ES2203533-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4150953)									
ES2203533-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.67	1.67	0.0	0% - 20%
EP262: Ethanolamines (QC Lot: 4151111)									
EP2201074-054	QC31	EP262: Ethanolamine	141-43-5	1	µg/L	<1	<1	0.0	No Limit
		EP262: Diethanolamine	111-42-2	1	µg/L	<1	<1	0.0	No Limit
		EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	<1	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4152608)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	103	81.5	118
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	93.8	76.2	106
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	81.2	66.9	138
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	96.9	79.1	113
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	89.5	78.9	112
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	95.5	81.5	126
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	99.5	81.0	119
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4152607)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.154 mg/kg	99.2	81.0	115
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4149788)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	0.5 mg/kg	84.0	41.0	111
EP068A: Organochlorine Pesticides (OC) (QCLot: 4149787)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	107	46.0	116
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	85.6	53.0	133
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	111	45.0	117
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	81.4	46.0	122
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	98.8	47.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	95.8	40.0	118
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	94.3	47.0	123
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	83.8	41.0	119
EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	103	43.0	119
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	116	41.0	131
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	61.8	41.0	119
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	114	41.0	127
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	93.6	44.0	122
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	113	37.0	129
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	84.6	41.0	127
EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	117	42.0	122
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	117	31.2	117
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	85.1	38.0	120
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	56.2	31.4	125
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	77.6	31.2	123

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4149787) - continued								
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	47.7	24.7	125
EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4149787)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	79.9	61.0	141
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	77.6	39.0	147
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	14.0	4.10	154
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	96.6	40.0	136
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	97.2	59.0	133
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	75.7	57.0	135
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	112	39.0	133
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	101	53.0	131
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	88.2	53.0	133
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	83.8	57.0	135
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	99.3	45.0	131
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	68.5	53.0	137
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	103	53.0	133
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	93.2	49.0	133
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	64.1	39.0	137
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	73.0	57.0	137
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	95.9	53.0	135
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	97.6	52.0	134
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	39.2	20.4	154
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4149786)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	111	71.0	123
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	105	69.0	129
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	113	65.0	125
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	107	71.0	125
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	103	66.0	124
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	94.8	60.0	112
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	123	67.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	82.4	65.0	127
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	95.1	57.0	125
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	65.4	57.0	131
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	84.0	65.0	125
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	96.6	69.0	127

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4149786) - continued								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	82.0	63.0	121
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	88.0	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	85.0	52.0	128
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	96.0	65.0	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4149785)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	1468 mg/kg	81.0	70.0	111
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3111 mg/kg	84.6	71.9	109
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	436 mg/kg	76.0	63.8	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4149789)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	32 mg/kg	87.4	66.0	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4149785)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	2234 mg/kg	84.4	72.8	110
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	2553 mg/kg	82.4	67.8	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	55.4	50.3	123
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4149789)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	37 mg/kg	91.4	66.0	122
EP080: BTEXN (QCLot: 4149789)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	82.4	72.0	122
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	82.7	75.0	119
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	85.4	73.0	121
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	88.3	74.0	122
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	87.4	75.0	121
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	82.0	64.0	126
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4151083)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.4	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.2	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.4	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4151083)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	80.0	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.8	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.2	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.6	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.6	72.0	129

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4151083) - continued								
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.2	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.0	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.0	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	90.1	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4151083)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	104	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	84.8	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	96.6	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.7	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.6	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4151083)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	85.6	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	78.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	78.8	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	70.0	69.2	143

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 4149924)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	89.6	118
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.2	89.2	116
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.5	87.8	114
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.2	85.8	115
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.2	88.4	111
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.0	87.4	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.1	88.1	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4149955)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	104	85.1	115
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4149823)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	5 µg/L	82.0	36.2	90.2
EP068A: Organochlorine Pesticides (OC) (QCLot: 4149821)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4149821) - continued								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	64.7	42.3	112
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	58.3	39.0	108
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	45.6	45.5	116
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	72.3	43.0	118
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	62.8	46.2	115
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	109	39.0	111
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	88.0	39.7	114
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	111	42.4	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	56.0	43.6	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	55.2	42.1	129
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	53.6	42.7	123
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	97.9	42.4	121
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	52.2	43.8	123
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	107	26.9	127
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	46.0	44.9	128
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	56.7	41.7	128
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	61.6	32.2	121
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	74.0	40.7	120
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	104	31.6	123
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	104	36.4	124
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	105	25.4	124
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4149821)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	83.4	38.8	110
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	107	34.6	115
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	5.1	----	----
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	31.5	27.8	102
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	117	46.1	122
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	111	46.6	118
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	64.5	26.8	110
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	116	38.8	119
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	105	45.0	119
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	49.4	44.6	118
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	44.6	30.2	112
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	102	43.2	123
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	107	41.1	119
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	99.9	34.4	125
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	26.2	19.9	123
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	40.5	38.0	121
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	88.6	39.5	121

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4149821) - continued								
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	83.3	39.7	119
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	6.3	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4149822)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	55.3	41.9	99.1
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	55.4	36.1	113
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	54.6	35.8	102
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	54.2	33.5	113
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	64.3	36.5	115
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	65.8	46.4	109
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	71.1	40.4	124
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	75.5	40.2	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	60.2	40.2	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	63.1	45.6	121
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	10 µg/L	63.7	43.2	123
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	64.7	47.3	121
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	62.4	44.8	123
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	59.9	38.8	120
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	62.6	39.4	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	68.1	40.1	123
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4149820)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	381 µg/L	53.4	39.3	103
EP071: C15 - C28 Fraction	----	100	µg/L	<100	389 µg/L	54.0	47.2	122
EP071: C29 - C36 Fraction	----	50	µg/L	<50	282 µg/L	53.2	42.5	119
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4150370)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	88.2	73.6	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4149820)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	393 µg/L	53.4	42.0	104
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	507 µg/L	50.3	46.2	116
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	276 µg/L	51.2	24.7	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4150370)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	87.6	73.9	115
EP080: BTEXN (QCLot: 4150370)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	90.4	84.1	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	90.8	81.0	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	85.0	84.4	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080: BTEXN (QCLot: 4150370) - continued								
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	88.0	84.3	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	88.8	86.5	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	89.4	77.0	118
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4150953)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	90.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	76.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	81.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	84.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	90.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	79.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4150953)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	86.4	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	87.0	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	87.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	89.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	91.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	88.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	87.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	91.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	80.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	97.4	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4150953)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	95.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	104	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	90.7	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	91.5	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	88.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	78.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	88.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4150953)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	92.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	87.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	96.0	67.0	138

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4150953) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	84.0	71.4	144
EP262: Ethanolamines (QCLot: 4151111)								
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	62.1	50.0	130
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	80.4	50.0	130
EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	10 µg/L	75.1	50.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4152608)							
EP2201008-043	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	106	70.0	130
		EG005T: Cadmium	7440-43-9	12.5 mg/kg	96.0	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	101	70.0	130
		EG005T: Copper	7440-50-8	50 mg/kg	112	70.0	130
		EG005T: Lead	7439-92-1	50 mg/kg	98.1	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	98.0	70.0	130
		EG005T: Zinc	7440-66-6	50 mg/kg	88.8	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4152607)							
EP2201008-043	Anonymous	EG035T: Mercury	7439-97-6	1 mg/kg	99.6	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4149786)							
EP2201074-009	SS11_0.5	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	110	73.5	125
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	114	70.8	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4149785)							
EP2201007-002	Anonymous	EP071: C10 - C14 Fraction	----	1468 mg/kg	81.3	64.7	126
		EP071: C15 - C28 Fraction	----	3111 mg/kg	85.0	61.7	124
		EP071: C29 - C36 Fraction	----	436 mg/kg	75.6	64.6	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4149789)							
EP2201007-002	Anonymous	EP080: C6 - C9 Fraction	----	24 mg/kg	81.0	69.1	135
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4149785)							
EP2201007-002	Anonymous	EP071: >C10 - C16 Fraction	----	2234 mg/kg	84.6	64.7	126
		EP071: >C16 - C34 Fraction	----	2553 mg/kg	82.7	61.7	124
		EP071: >C34 - C40 Fraction	----	150 mg/kg	65.3	64.6	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4149789)							

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4149789) - continued							
EP2201007-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	29 mg/kg	74.2	69.1	135
EP080: BTEXN (QCLot: 4149789)							
EP2201007-002	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	87.2	76.4	118
		EP080: Toluene	108-88-3	2 mg/kg	92.2	67.4	112
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4151083)							
EP2201074-008	SS11_0	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	82.4	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	# 62.8	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	75.2	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	75.2	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	87.6	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	87.2	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4151083)							
EP2201074-008	SS11_0	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	78.0	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	76.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	102	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	80.8	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	84.4	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	84.0	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	88.0	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	86.4	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	80.0	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	68.0	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	85.7	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4151083)							
EP2201074-008	SS11_0	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	81.6	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	93.1	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	87.5	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	87.3	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	82.5	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	89.6	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	80.0	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4151083)							
EP2201074-008	SS11_0	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	73.2	62.0	145

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4151083) - continued							
EP2201074-008	SS11_0	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	78.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	93.2	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	84.8	69.2	143

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EG020T: Total Metals by ICP-MS (QCLot: 4149924)							
EP2200993-017	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	97.5	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	98.6	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	95.7	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	95.9	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	107	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	95.6	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	95.0	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4149955)							
EP2201073-001	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	97.2	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4150370)							
EP2200904-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	92.2	77.0	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4150370)							
EP2200904-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	78.4	77.0	137
EP080: BTEXN (QCLot: 4150370)							
EP2200904-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	107	77.0	122
		EP080: Toluene	108-88-3	20 µg/L	120	73.5	126
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4150953)							
ES2203533-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	89.6	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	76.2	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	87.4	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	87.6	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	# Not Determined	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	92.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4150953)							
ES2203533-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	89.2	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	92.4	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	118	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	91.6	72.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4150953) - continued							
ES2203533-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	91.2	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	96.8	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	95.8	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	92.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	95.2	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	80.2	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	101	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4150953)							
ES2203533-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	93.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	114	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	106	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	96.7	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	101	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	85.2	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	93.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4150953)							
ES2203533-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	84.0	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	93.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	91.2	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	90.0	71.4	144
EP262: Ethanolamines (QCLot: 4151111)							
EP2201074-054	QC31	EP262: Ethanolamine	141-43-5	10 µg/L	# 33.6	50.0	130
		EP262: Diethanolamine	111-42-2	10 µg/L	92.9	50.0	130
		EP262: Methyl diethanolamine (MDEA)	105-59-9	10 µg/L	116	50.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201074**	Page	: 1 of 14
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman PSI	Date Samples Received	: 01-Feb-2022
Site	: ----	Issue Date	: 08-Feb-2022
Sampler	: SANJANA AUDIT	No. of samples received	: 54
Order number	: ----	No. of samples analysed	: 45

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2201074--008	SS11_0	**Perfluoropentane sulfonic acid (PFPeS)**	2706-91-4	62.8 %	73.0-123%	**Recovery less than lower data quality objective**

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	ES2203533--001	Anonymous	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP262: Ethanolamines	EP2201074--054	QC31	**Ethanolamine**	141-43-5	33.6 %	50.0-130%	**Recovery less than lower data quality objective**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method		*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	***Days overdue***	*Date analysed*	*Due for analysis*	***Days overdue***
EA037: Ass Field Screening Analysis							
Snap Lock Bag							
ASS21_0,	ASS21_0.25,	03-Feb-2022	29-Jan-2022	**5**	04-Feb-2022	29-Jan-2022	**6**
ASS1_0,	ASS1_0.25,						
ASS1_0.5,	ASS1_0.75,						
ASS1_1.0,	ASS1_1.25,						
ASS1_1.50,	ASS1_1.75,						
ASS1_2.00,	ASS1_2.25,						
ASS1_2.50,	ASS1_2.75,						
ASS1_3.00,	ASS2_0,						
ASS2_0.25,	ASS3_0,						
ASS3_0.25,	ASS3_0.50,						
ASS3_0.75,	ASS3_0.90,						
ASS4_0,	ASS4_0.25,						
ASS4_0.50,	ASS4_0.75,						
ASS4_1.0,	ASS4_1.25,						
ASS5_0,	ASS5_0.25,						
ASS5_0.50,	ASS5_0.75,						
ASS5_0.90,	QC28						

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Matrix Spikes (MS)					
Pesticides by GCMS	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	2	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	2	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
Container / *Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EA037: Ass Field Screening Analysis							
Snap Lock Bag (EA037)							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis - Continued								
ASS21_0,	ASS21_0.25,	**28-Jan-2022**	**03-Feb-2022**	29-Jan-2022	×	**04-Feb-2022**	29-Jan-2022	×
ASS1_0,	ASS1_0.25,							
ASS1_0.5,	ASS1_0.75,							
ASS1_1.0,	ASS1_1.25,							
ASS1_1.50,	ASS1_1.75,							
ASS1_2.00,	ASS1_2.25,							
ASS1_2.50,	ASS1_2.75,							
ASS1_3.00,	ASS2_0,							
ASS2_0.25,	ASS3_0,							
ASS3_0.25,	ASS3_0.50,							
ASS3_0.75,	ASS3_0.90,							
ASS4_0,	ASS4_0.25,							
ASS4_0.50,	ASS4_0.75,							
ASS4_1.0,	ASS4_1.25,							
ASS5_0,	ASS5_0.25,							
ASS5_0.50,	ASS5_0.75,							
ASS5_0.90,	QC28							
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
SS19_0,	SS19_0.5,	**28-Jan-2022**	**----**	----	----	**03-Feb-2022**	11-Feb-2022	✓
SS11_0,	SS11_0.5,							
SS9_0,	SS9_1.0,							
QC21,	QC23,							
QC25								
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Snap Lock Bag - ACM/Asbestos Grab Bag (EA200)								
SS19_0,	SS19_0.5,	**28-Jan-2022**	**----**	----	----	**02-Feb-2022**	27-Jul-2022	✓
SS11_0,	SS11_0.5,							
SS9_0								
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
SS19_0,	SS19_0.5,	**28-Jan-2022**	**03-Feb-2022**	27-Jul-2022	✓	**04-Feb-2022**	27-Jul-2022	✓
SS11_0,	SS11_0.5,							
SS9_0,	SS9_1.0,							
QC21,	QC23,							
QC25								

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) SS19_0, SS19_0.5, SS11_0, SS11_0.5, SS9_0, SS9_1.0, QC21, QC23, QC25	**28-Jan-2022**	**03-Feb-2022**	25-Feb-2022	✓	**04-Feb-2022**	25-Feb-2022	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066) SS9_0, SS9_1.0, QC25	**28-Jan-2022**	**02-Feb-2022**	11-Feb-2022	✓	**03-Feb-2022**	14-Mar-2022	✓
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068) SS9_0, SS9_1.0, QC25	**28-Jan-2022**	**02-Feb-2022**	11-Feb-2022	✓	**03-Feb-2022**	14-Mar-2022	✓
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068) SS9_0, SS9_1.0, QC25	**28-Jan-2022**	**02-Feb-2022**	11-Feb-2022	✓	**03-Feb-2022**	14-Mar-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) SS11_0, SS11_0.5, SS9_0, SS9_1.0, QC21, QC23, QC25	**28-Jan-2022**	**02-Feb-2022**	11-Feb-2022	✓	**03-Feb-2022**	14-Mar-2022	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) SS11_0, SS11_0.5, SS9_0, SS9_1.0, QC21, QC23, QC25	**28-Jan-2022**	**02-Feb-2022**	11-Feb-2022	✓	**02-Feb-2022**	11-Feb-2022	✓
Soil Glass Jar - Unpreserved (EP071) SS11_0, SS11_0.5, SS9_0, SS9_1.0, QC21, QC23, QC25	**28-Jan-2022**	**02-Feb-2022**	11-Feb-2022	✓	**03-Feb-2022**	14-Mar-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) SS11_0, SS11_0.5, SS9_0, SS9_1.0, QC21, QC23, QC25	**28-Jan-2022**	**02-Feb-2022**	11-Feb-2022	✓	**02-Feb-2022**	11-Feb-2022	✓
Soil Glass Jar - Unpreserved (EP071) SS11_0, SS11_0.5, SS9_0, SS9_1.0, QC21, QC23, QC25	**28-Jan-2022**	**02-Feb-2022**	11-Feb-2022	✓	**03-Feb-2022**	14-Mar-2022	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) SS11_0, SS11_0.5, SS9_0, SS9_1.0, QC21, QC23, QC25	**28-Jan-2022**	**02-Feb-2022**	11-Feb-2022	✓	**02-Feb-2022**	11-Feb-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) SS11_0, SS11_0.5, SS9_0, SS9_1.0, QC21, QC23, QC25	**28-Jan-2022**	**03-Feb-2022**	27-Jul-2022	✓	**03-Feb-2022**	15-Mar-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) SS11_0, SS11_0.5, SS9_0, SS9_1.0, QC21, QC23, QC25	**28-Jan-2022**	**03-Feb-2022**	27-Jul-2022	✓	**03-Feb-2022**	15-Mar-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) SS11_0, SS11_0.5, SS9_0, SS9_1.0, QC21, QC23, QC25	**28-Jan-2022**	**03-Feb-2022**	27-Jul-2022	✓	**03-Feb-2022**	15-Mar-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) SS11_0, SS11_0.5, SS9_0, SS9_1.0, QC21, QC23, QC25	**28-Jan-2022**	**03-Feb-2022**	27-Jul-2022	✓	**03-Feb-2022**	15-Mar-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) SS11_0, SS11_0.5, SS9_0, SS9_1.0, QC21, QC23, QC25	**28-Jan-2022**	**03-Feb-2022**	27-Jul-2022	✓	**03-Feb-2022**	15-Mar-2022	✓
EP262: Ethanolamines							
Soil Glass Jar - Unpreserved (EP262) SS11_0, SS11_0.5, QC21, QC23	**28-Jan-2022**	**----**	----	----	**03-Feb-2022**	11-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T) QC31	**28-Jan-2022**	**02-Feb-2022**	27-Jul-2022	✓	**02-Feb-2022**	27-Jul-2022	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG035T) QC31	**28-Jan-2022**	**----**	----	----	**03-Feb-2022**	25-Feb-2022	✓
EP066: Polychlorinated Biphenyls (PCB)							
Amber Glass Bottle - Unpreserved (EP066) QC31	**28-Jan-2022**	**02-Feb-2022**	04-Feb-2022	✓	**04-Feb-2022**	14-Mar-2022	✓
EP068A: Organochlorine Pesticides (OC)							
Amber Glass Bottle - Unpreserved (EP068) QC31	**28-Jan-2022**	**02-Feb-2022**	04-Feb-2022	✓	**04-Feb-2022**	14-Mar-2022	✓
EP068B: Organophosphorus Pesticides (OP)							
Amber Glass Bottle - Unpreserved (EP068) QC31	**28-Jan-2022**	**02-Feb-2022**	04-Feb-2022	✓	**04-Feb-2022**	14-Mar-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) QC31	**28-Jan-2022**	**02-Feb-2022**	04-Feb-2022	✓	**04-Feb-2022**	14-Mar-2022	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) QC30, QC31	**28-Jan-2022**	**02-Feb-2022**	04-Feb-2022	✓	**04-Feb-2022**	14-Mar-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC30, QC31	**28-Jan-2022**	**02-Feb-2022**	11-Feb-2022	✓	**02-Feb-2022**	11-Feb-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) QC30, QC31	**28-Jan-2022**	**02-Feb-2022**	04-Feb-2022	✓	**04-Feb-2022**	14-Mar-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC30, QC31	**28-Jan-2022**	**02-Feb-2022**	11-Feb-2022	✓	**02-Feb-2022**	11-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
QC30, QC31	28-Jan-2022	02-Feb-2022	11-Feb-2022	✓	02-Feb-2022	11-Feb-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
QC31	28-Jan-2022	03-Feb-2022	27-Jul-2022	✓	03-Feb-2022	27-Jul-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
QC31	28-Jan-2022	03-Feb-2022	27-Jul-2022	✓	03-Feb-2022	27-Jul-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
QC31	28-Jan-2022	03-Feb-2022	27-Jul-2022	✓	03-Feb-2022	27-Jul-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
QC31	28-Jan-2022	03-Feb-2022	27-Jul-2022	✓	03-Feb-2022	27-Jul-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
QC31	28-Jan-2022	03-Feb-2022	27-Jul-2022	✓	03-Feb-2022	27-Jul-2022	✓
EP262: Ethanolamines							
Amber Bottle Unpreserved for Specialist Organics (EP262)							
QC31	28-Jan-2022	----	----	----	03-Feb-2022	04-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	4	34	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	3	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	3	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
TRH Volatiles/BTEX	EP080	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ethanolamines by LCMSMS	EP262	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	2	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ethanolamines by LCMSMS	EP262	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ethanolamines by LCMSMS	EP262	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ethanolamines by LCMSMS	EP262	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Polychlorinated Biphenyls (PCB)	EP066	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	2	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines in Soils	EP262	SOIL	In House: 2g of soil is extracted into 10 mL of water then analysed by analysed by LC/MSMS in ESI Positive Mode.

Analytical Methods	Method	Matrix	Method Descriptions
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines by LCMSMS	EP262	WATER	In house: LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.

Preparation Methods	Method	Matrix	Method Descriptions
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office: Perth – Tetra Tech Coffey @coffey.
Report Results to: Bernie Weekes Mobile: 0407817762. Email: bernie.weekes @tetratech.com
Invoices to: Phone: Email: - @tetratech.com

Project No: 754-PERENV295751 Task No:
Project Name: Pardoman PSI Laboratory: ALS (ARL-Eurofins for trip.
Sampler's Name: S.Audit Project Manager: Bernie Weekes
Quote number (if different to current quoted prices):
Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)
1	SS19-0	28/1/22	AM	Soil	1P, 2J, 1Z	5-day
2	SS19-0.5				"	
3	SS19-1				1P, 2J	
4	SS19-1.5				"	
5	SS19-2				"	
6	ASS21-0				1Z	
7	ASS21-0.25				"	
8	SS11-0				1P, 2J, 1Z	
9	SS11-0.5				"	
10	SS11-1.0				1P, 2J	
11	SS11-2.0				"	
12	ASS1-0				1Z	
13	ASS1-0.25				"	
14	ASS1-0.5				"	
15	ASS1-0.75				"	
16	ASS1-1.0				"	

NOTES

To be advised:
- Which samples to analyse
- Which analysis.

Please contact Bernie Weekes

Only 2 of the 3 esks on on-note 8109606666 contain the samples on these 4 pages of COC. Nick Taylor will provide the other COC.

RELINQUISHED BY	RECEIVED BY
Name: Sanjana Audit Date: 28/1/22 →	Name: L Duffy Date: 1/2/22
Coffey Time:	Company: ALS Time: 1150
Name: Date: →	Name: Date:
Company: Time:	Company: Time:

Sample Receipt Advice: (Lab Use Only)
All Samples Recieved in Good Condition ☐
All Docume
Samples Re
Lab. Ref/Ba

Environmental Division Perth
Work Order Reference
EP2201074

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Chain of custody
Issued: 30 July 2020
UNCONTROLLED WHEN PRINTED

Telephone : -- 61-8-9406 1301

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:

Report Results to: Mobile: Email: @tetratech.com

Invoices to: Phone: Email: @tetratech.com

Project No: 754-PERGN295751 Task No:

Project Name: Perdamaian PST Laboratory:

Sampler's Name: Project Manager:

Quote number (if different to current quoted prices):

Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	NOTES
17	ASS1_1.25	28/1/22	AM	Soil	1Z	5-day	
18	ASS1_1.50	"	"	"	"		
19	ASS1_1.75	"	"	"	"		
20	ASS1_2.00	"	"	"	"		
21	ASS1_2.25	"	"	"	"		
22	ASS1_2.50	"	"	"	"		
23	ASS1_2.75	"	"	"	"		
24	ASS1_3.00	"	"	"	"		
25	ASS2_0	"	"	"	"		
26	ASS2_0.25	"	"	"	"		
27	ASS3_0	"	"	"	"		
28	ASS3_0.25	"	"	"	"		
29	ASS3_0.50	"	"	"	"		
30	ASS3_0.75	"	"	"	"		
31	ASS3_0.90	"	"	"	"		
32	SS9_0	"	"	"	1Z, 2J, 1PA		

RELINQUISHED BY		RECEIVED BY	
Name: Sanjana Audit	Date: 28/1/22 →	Name:	Date:
Coffey	Time:	Company:	Time:
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐

All Documentation is in Proper Order ☐

Samples Received Properly Chilled ☐

Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:

Report Results to: Mobile: Email: @tetratech.com

Invoices to: Phone: Email: @tetratech.com

Project No: Task No:

Project Name: 754-PEREN295751 Laboratory:

Sampler's Name: Perdaman PST Project Manager:

Quote number (if different to current quoted prices):

Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	NOTES
33	SS9-0.5	28/1/22	AM	S	1Z, 2J, 1P	5days	
34	SS9-1.0				2J, 1P		
35	SS9-1.3				"		
36	ASS4-0				1Z		
37	ASS4-0.25				"		
38	ASS4-0.50				"		
39	ASS4-0.75				"		
40	ASS4-1.0				"		
41	ASS4-1.25				"		
42	ASS5-0				"		
43	ASS5-0.25				"		
44	ASS5-0.50				"		
45	ASS5-0.75				"		
46	ASS5-0.90				"		
47	QC21				1Z, 2J, 1P		~~Full analysis + asbestos~~
	QC22				"		~~Full + asbestos~~

RELINQUISHED BY		RECEIVED BY	
Name: Sanjana Audit	Date: 28/1/22 →	Name:	Date:
Coffey	Time:	Company:	Time:
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐

All Documentation is in Proper Order ☐

Samples Received Properly Chilled ☐

Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:

Report Results to: Mobile: Email: @tetratech.com

Invoices to: Phone: Email: @tetratech.com

Project No: 75U-PERENJ95751 Task No:

Project Name: Perdaman PST Laboratory:

Sampler's Name: Project Manager:

Quote number (if different to current quoted prices):

Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	NOTES
48	QC23	28/1	AM	S	~~SOIL~~ 1P, 2J	5 days.	
	QC24	↓	↓	↓	1P, 2J		
49	QC25				"		
	QC26	↓	↓	↓	"		
50	QC27				1Z		
51	QC28				↓		
52	QC29	↓	↓	↓	↓		
53	QC30			W	various (2x40 ml vials + 1x100ml bottle)		
54	QC31	↓	↓	"	various (2x40ml vials, 2x100ml bottles amber), 2 PFAS bottles, 1 inorgs bottle, 1 metals bottle)		

RELINQUISHED BY		RECEIVED BY	
Name: Sanjana Audit	Date: 28/1/22 →	Name:	Date:
Coffey	Time:	Company:	Time:
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐

All Documentation is in Proper Order ☐

Samples Received Properly Chilled ☐

Lab. Ref/Batch No.

***Container Type & Preservation Codes:** P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201086**	Page	: 1 of 25
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 01-Feb-2022 11:50
Order number	: ----	Date Analysis Commenced	: 02-Feb-2022
C-O-C number	: ----	Issue Date	: 08-Feb-2022 13:40
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 29		
No. of samples analysed	: 24		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X and EP262 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP262: Poor matrix spike recovery for particular compounds due to matrix interferences.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EP262: ALS is not NATA accredited for the analysis of MDEA.
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS20_0m	ASS20_0.25m	ASS20_0.5m	ASS20_0.75m	ASS20_1.0m
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201086-001	EP2201086-002	EP2201086-003	EP2201086-004	EP2201086-005
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.4**	**9.1**	**9.3**	**9.0**	**9.0**
pH (Fox)	----	0.1	pH Unit	**7.4**	**9.3**	**9.2**	**7.5**	**7.2**
Reaction Rate	----	1	-	**Moderate**	**Strong**	**Strong**	**Strong**	**Strong**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS20_1.25m	ASS20_1.5m	ASS20_1.75m	ASS20_2.0m	SS27_0m
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201086-006	EP2201086-007	EP2201086-008	EP2201086-009	EP2201086-010
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	9.0	8.7	9.2	8.9	----
pH (Fox)	----	0.1	pH Unit	8.4	8.2	8.8	8.5	----
Reaction Rate	----	1	-	Strong	Strong	Strong	Extreme	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	----	----	----	----	11.5
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	----	----	----	6
Cadmium	7440-43-9	1	mg/kg	----	----	----	----	<1
Chromium	7440-47-3	2	mg/kg	----	----	----	----	21
Copper	7440-50-8	5	mg/kg	----	----	----	----	7
Lead	7439-92-1	5	mg/kg	----	----	----	----	<5
Nickel	7440-02-0	2	mg/kg	----	----	----	----	11
Zinc	7440-66-6	5	mg/kg	----	----	----	----	22
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	----	----	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	----	----	----	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	----	----	----	----	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	----	----	----	----	<0.05
beta-BHC	319-85-7	0.05	mg/kg	----	----	----	----	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	----	----	----	----	<0.05
delta-BHC	319-86-8	0.05	mg/kg	----	----	----	----	<0.05
Heptachlor	76-44-8	0.05	mg/kg	----	----	----	----	<0.05
Aldrin	309-00-2	0.05	mg/kg	----	----	----	----	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	----	----	----	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	----	----	----	----	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	----	----	----	----	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	----	----	----	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	----	----	----	----	<0.05
Dieldrin	60-57-1	0.05	mg/kg	----	----	----	----	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	----	----	----	----	<0.05
Endrin	72-20-8	0.05	mg/kg	----	----	----	----	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	----	----	----	----	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS20_1.25m	ASS20_1.5m	ASS20_1.75m	ASS20_2.0m	SS27_0m
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201086-006	EP2201086-007	EP2201086-008	EP2201086-009	EP2201086-010
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	----	----	----	----	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	----	----	----	----	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	----	----	----	----	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	----	----	----	----	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	----	----	----	----	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	----	----	----	----	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	----	----	----	----	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	----	----	----	----	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	----	----	----	----	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	----	----	----	----	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	----	----	----	----	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	----	----	----	----	<0.2
Dimethoate	60-51-5	0.05	mg/kg	----	----	----	----	<0.05
Diazinon	333-41-5	0.05	mg/kg	----	----	----	----	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	----	----	----	----	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	----	----	----	----	<0.2
Malathion	121-75-5	0.05	mg/kg	----	----	----	----	<0.05
Fenthion	55-38-9	0.05	mg/kg	----	----	----	----	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	----	----	----	<0.05
Parathion	56-38-2	0.2	mg/kg	----	----	----	----	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	----	----	----	----	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	----	----	----	----	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	----	----	----	----	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	----	----	----	----	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	----	----	----	----	<0.05
Ethion	563-12-2	0.05	mg/kg	----	----	----	----	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	----	----	----	----	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	----	----	----	----	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	----	----	----	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	----	----	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	----	----	----	----	<0.5
Fluorene	86-73-7	0.5	mg/kg	----	----	----	----	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS20_1.25m	ASS20_1.5m	ASS20_1.75m	ASS20_2.0m	SS27_0m
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201086-006	EP2201086-007	EP2201086-008	EP2201086-009	EP2201086-010
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Phenanthrene	85-01-8	0.5	mg/kg	----	----	----	----	<0.5
Anthracene	120-12-7	0.5	mg/kg	----	----	----	----	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	----	----	----	----	<0.5
Pyrene	129-00-0	0.5	mg/kg	----	----	----	----	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	----	----	----	<0.5
Chrysene	218-01-9	0.5	mg/kg	----	----	----	----	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	----	----	----	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	----	----	----	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	----	----	----	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	----	----	----	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	----	----	----	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	----	----	----	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	----	----	----	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	----	----	----	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	----	----	----	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	----	----	----	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	----	----	----	<10
C10 - C14 Fraction	----	50	mg/kg	----	----	----	----	<50
C15 - C28 Fraction	----	100	mg/kg	----	----	----	----	<100
C29 - C36 Fraction	----	100	mg/kg	----	----	----	----	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	----	----	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	----	----	----	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	----	----	----	<10
>C10 - C16 Fraction	----	50	mg/kg	----	----	----	----	<50
>C16 - C34 Fraction	----	100	mg/kg	----	----	----	----	<100
>C34 - C40 Fraction	----	100	mg/kg	----	----	----	----	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	----	----	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	----	----	----	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	----	----	----	<0.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS20_1.25m	ASS20_1.5m	ASS20_1.75m	ASS20_2.0m	SS27_0m
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201086-006	EP2201086-007	EP2201086-008	EP2201086-009	EP2201086-010
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
Toluene	108-88-3	0.5	mg/kg	----	----	----	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	----	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	----	<0.5
^ Sum of BTEX	----	0.2	mg/kg	----	----	----	----	<0.2
^ Total Xylenes	----	0.5	mg/kg	----	----	----	----	<0.5
Naphthalene	91-20-3	1	mg/kg	----	----	----	----	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	----	----	----	----	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	----	----	----	----	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	----	----	----	----	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS20_1.25m	ASS20_1.5m	ASS20_1.75m	ASS20_2.0m	SS27_0m
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201086-006	EP2201086-007	EP2201086-008	EP2201086-009	EP2201086-010
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	----	----	----	----	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	----	----	----	----	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	----	----	----	----	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	----	----	----	----	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	----	----	----	----	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	----	----	----	----	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	----	----	----	----	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	----	----	----	----	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	----	----	----	----	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	----	----	----	----	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	----	----	----	----	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	----	----	----	----	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	----	----	----	----	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	----	----	----	----	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	----	----	----	----	<0.0002
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	----	----	----	----	**85.9**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS20_1.25m	ASS20_1.5m	ASS20_1.75m	ASS20_2.0m	SS27_0m
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201086-006	EP2201086-007	EP2201086-008	EP2201086-009	EP2201086-010
				Result	Result	Result	Result	Result
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	----	----	----	----	81.7
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	----	----	----	----	37.2
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	----	----	----	----	95.4
2-Chlorophenol-D4	93951-73-6	0.5	%	----	----	----	----	89.3
2.4.6-Tribromophenol	118-79-6	0.5	%	----	----	----	----	94.1
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	----	----	----	----	117
Anthracene-d10	1719-06-8	0.5	%	----	----	----	----	114
4-Terphenyl-d14	1718-51-0	0.5	%	----	----	----	----	111
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	----	----	----	83.0
Toluene-D8	2037-26-5	0.2	%	----	----	----	----	84.1
4-Bromofluorobenzene	460-00-4	0.2	%	----	----	----	----	88.7
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	----	----	----	----	112
13C8-PFOA	----	0.0002	%	----	----	----	----	105

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS27_0.5m	SS17_0m	SS17_0.5m	SS16_0m	SS16_0.5m
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201086-011	EP2201086-013	EP2201086-014	EP2201086-016	EP2201086-017
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	----	----	----	0.6	1.2
Moisture Content	----	1.0	%	15.2	<1.0	<1.0	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	7	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	27	29	116	31	22
Copper	7440-50-8	5	mg/kg	9	16	13	8	6
Lead	7439-92-1	5	mg/kg	<5	5	<5	<5	<5
Nickel	7440-02-0	2	mg/kg	14	17	14	10	13
Zinc	7440-66-6	5	mg/kg	15	38	32	30	33
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	----	----	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS27_0.5m	SS17_0m	SS17_0.5m	SS16_0m	SS16_0.5m
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201086-011	EP2201086-013	EP2201086-014	EP2201086-016	EP2201086-017
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	----	----	----
Malathion	121-75-5	0.05	mg/kg	<0.05	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	----	----	----
Parathion	56-38-2	0.2	mg/kg	<0.2	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	----	----	----
Ethion	563-12-2	0.05	mg/kg	<0.05	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS27_0.5m	SS17_0m	SS17_0.5m	SS16_0m	SS16_0.5m
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201086-011	EP2201086-013	EP2201086-014	EP2201086-016	EP2201086-017
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS27_0.5m	SS17_0m	SS17_0.5m	SS16_0m	SS16_0.5m
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201086-011	EP2201086-013	EP2201086-014	EP2201086-016	EP2201086-017
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231C: Perfluoroalkyl Sulfonamides								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS27_0.5m	SS17_0m	SS17_0.5m	SS16_0m	SS16_0.5m
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201086-011	EP2201086-013	EP2201086-014	EP2201086-016	EP2201086-017
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	10	mg/kg	----	<10	<10	<10	<10
Diethanolamine	111-42-2	10	mg/kg	----	<10	<10	<10	<10
Methyl diethanolamine (MDEA)	105-59-9	10	mg/kg	----	<10	<10	<10	<10
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS27_0.5m	SS17_0m	SS17_0.5m	SS16_0m	SS16_0.5m
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201086-011	EP2201086-013	EP2201086-014	EP2201086-016	EP2201086-017
				Result	Result	Result	Result	Result
EP066S: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	0.1	%	55.3	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	86.9	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	61.6	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	90.3	93.9	88.7	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	90.5	95.2	87.6	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	89.6	88.5	70.2	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	120	125	117	----	----
Anthracene-d10	1719-06-8	0.5	%	114	121	111	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	116	123	115	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	76.7	81.6	85.7	----	----
Toluene-D8	2037-26-5	0.2	%	75.4	83.3	84.3	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	82.2	86.0	88.7	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	105	106	103	103	----
13C8-PFOA	----	0.0002	%	99.5	106	104	94.0	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS20_0m	SS20_0.5m	SS18_0m	SS18_0.5m	ASS19_0m
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00	27-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201086-018	EP2201086-019	EP2201086-021	EP2201086-022	EP2201086-024
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	----	----	----	----	8.7
pH (Fox)	----	0.1	pH Unit	----	----	----	----	8.3
Reaction Rate	----	1	-	----	----	----	----	Extreme
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	1.3	2.6	----	----	----
Moisture Content	----	1.0	%	----	----	2.7	12.1	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	6	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg	29	23	27	60	----
Copper	7440-50-8	5	mg/kg	13	9	6	15	----
Lead	7439-92-1	5	mg/kg	8	<5	<5	10	----
Nickel	7440-02-0	2	mg/kg	14	12	13	42	----
Zinc	7440-66-6	5	mg/kg	28	27	14	23	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS19_0.25m	ASS19_0.5m	----	----	----
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201086-025	EP2201086-026	--------	--------	--------
				Result	Result	----	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.6**	**8.7**	**----**	**----**	**----**
pH (Fox)	----	0.1	pH Unit	**8.2**	**7.8**	**----**	**----**	**----**
Reaction Rate	----	1	-	**Extreme**	**Extreme**	**----**	**----**	**----**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC19	QC20	----	----	----
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201086-027	EP2201086-028	--------	--------	--------
				Result	Result	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	<1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	<0.5	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	----	----	----	----
beta-BHC	319-85-7	0.5	µg/L	<0.5	----	----	----	----
gamma-BHC	58-89-9	0.5	µg/L	<0.5	----	----	----	----
delta-BHC	319-86-8	0.5	µg/L	<0.5	----	----	----	----
Heptachlor	76-44-8	0.5	µg/L	<0.5	----	----	----	----
Aldrin	309-00-2	0.5	µg/L	<0.5	----	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	----	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	----	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	----	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	----	----	----	----
Dieldrin	60-57-1	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDE	72-55-9	0.5	µg/L	<0.5	----	----	----	----
Endrin	72-20-8	0.5	µg/L	<0.5	----	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDD	72-54-8	0.5	µg/L	<0.5	----	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	----	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDT	50-29-3	2.0	µg/L	<2.0	----	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	----	----	----	----
Methoxychlor	72-43-5	2.0	µg/L	<2.0	----	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC19	QC20	----	----	----
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201086-027	EP2201086-028	--------	--------	--------
				Result	Result	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	<0.5	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	----	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	----	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	----	----	----	----
Dimethoate	60-51-5	0.5	µg/L	<0.5	----	----	----	----
Diazinon	333-41-5	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	----	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	----	----	----	----
Malathion	121-75-5	0.5	µg/L	<0.5	----	----	----	----
Fenthion	55-38-9	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	----	----	----	----
Parathion	56-38-2	2.0	µg/L	<2.0	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	----	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	----	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	----	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	----	----	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	----	----	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	----	----	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	----	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC19	QC20	----	----	----
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201086-027	EP2201086-028	--------	--------	--------
				Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC19	QC20	----	----	----
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201086-027	EP2201086-028	--------	--------	--------
				Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC19	QC20	----	----	----
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201086-027	EP2201086-028	--------	--------	--------
				Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<1	----	----	----	----
Diethanolamine	111-42-2	1	µg/L	<1	----	----	----	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	----	----	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	1	%	**56.0**	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	**67.4**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	**66.4**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC19	QC20	----	----	----
			Sampling date / time	27-Jan-2022 00:00	27-Jan-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2201086-027	EP2201086-028	--------	--------	--------
				Result	Result	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates - Continued								
Phenol-d6	13127-88-3	1.0	%	19.3	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	50.8	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	25.0	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	55.8	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%	63.3	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	76.7	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	82.0	82.5	----	----	----
Toluene-D8	2037-26-5	2	%	98.9	96.1	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	104	99.9	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	110	----	----	----	----
13C8-PFOA	----	0.02	%	101	----	----	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	43	119
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	53	152
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	28	152
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	57	119
2-Chlorophenol-D4	93951-73-6	52	130
2.4.6-Tribromophenol	118-79-6	40	132
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	53	139
Anthracene-d10	1719-06-8	68	124
4-Terphenyl-d14	1718-51-0	66	132
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	63	132
Toluene-D8	2037-26-5	66	125
4-Bromofluorobenzene	460-00-4	60	124
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	27	136
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	50	146
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	27	153
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	67
2-Chlorophenol-D4	93951-73-6	29	120
2.4.6-Tribromophenol	118-79-6	10	131
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	34	131
Anthracene-d10	1719-06-8	43	126
4-Terphenyl-d14	1718-51-0	41	142

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EP262: Ethanolamines

(WATER) EP262: Ethanolamines

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2201086**	Page	: 1 of 21
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 01-Feb-2022
Order number	: ----	Date Analysis Commenced	: 02-Feb-2022
C-O-C number	: ----	Issue Date	: 08-Feb-2022
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 29		
No. of samples analysed	: 24		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4152598)									
EP2201086-010	SS27_0m	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	21	20	5.5	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	11	10	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	7	8	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	22	22	0.0	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 4152502)									
EP2201086-001	ASS20_0m	EA037: pH (F)	----	0.1	pH Unit	8.4	8.4	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	7.4	7.4	0.0	0% - 20%
EP2201086-024	ASS19_0m	EA037: pH (F)	----	0.1	pH Unit	8.7	8.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	8.3	8.3	0.0	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4152601)									
EP2201007-001	Anonymous	EA055: Moisture Content	----	0.1	%	3.0	2.8	6.9	0% - 20%
EP2201086-018	SS20_0m	EA055: Moisture Content	----	0.1	%	1.3	1.2	0.0	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4152597)									
EP2201086-010	SS27_0m	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 4152059)									
EP2201086-010	SS27_0m	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4152056)									
EP2201086-010	SS27_0m	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4152056) - continued									
EP2201086-010	SS27_0m	EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4152056)									
EP2201086-010	SS27_0m	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4152056) - continued									
EP2201086-010	SS27_0m	EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4152058)									
EP2201086-010	SS27_0m	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4152055)									
EP2201086-010	SS27_0m	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4152057)									
EP2201086-010	SS27_0m	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4152055)									
EP2201086-010	SS27_0m	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4152057)									
EP2201086-010	SS27_0m	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080: BTEXN (QC Lot: 4152055)									
EP2201086-010	SS27_0m	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP080: BTEXN (QC Lot: 4152055) - continued									
EP2201086-010	SS27_0m	EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4152680)									
EP2201086-010	SS27_0m	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4152680)									
EP2201086-010	SS27_0m	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4152680)									
EP2201086-010	SS27_0m	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4152680)									
EP2201086-010	SS27_0m	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4152680) - continued									
EP2201086-010	SS27_0m	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 4149924)									
EP2200982-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0004	0.0005	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.010	0.010	0.0	No Limit
EP2201080-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.028	0.028	0.0	0% - 20%
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.010	0.009	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4149955)									
EP2201050-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EP2201100-003	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4150370)									
EP2200904-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4150370)									
EP2200904-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 4150370)									
EP2200904-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4153130)									

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4153130) - continued									
ES2203695-002	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EW2200382-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4153130)									
ES2203695-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EW2200382-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4153130)									
ES2203695-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4153130) - continued									
ES2203695-002	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EW2200382-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4153130)									
ES2203695-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EW2200382-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4153130)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 4153130) - continued									
ES2203695-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.04	0.04	0.0	No Limit
EW2200382-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP262: Ethanolamines (QC Lot: 4152818)									
EP2201086-027	QC19	EP262: Ethanolamine	141-43-5	1	µg/L	<1	<1	0.0	No Limit
		EP262: Diethanolamine	111-42-2	1	µg/L	<1	<1	0.0	No Limit
		EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	<1	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4152598)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	96.5	81.5	118
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	91.6	76.2	106
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	76.6	66.9	138
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	95.3	79.1	113
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	89.8	78.9	112
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	90.9	81.5	126
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	93.4	81.0	119
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4152597)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.154 mg/kg	97.0	81.0	115
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4152059)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	0.5 mg/kg	82.0	41.0	111
EP068A: Organochlorine Pesticides (OC) (QCLot: 4152056)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	77.5	46.0	116
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	77.6	53.0	133
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	52.2	45.0	117
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	90.9	46.0	122
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	78.5	47.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	47.6	40.0	118
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	80.5	47.0	123
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	67.9	41.0	119
EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	81.9	43.0	119
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	78.9	41.0	131
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	81.1	41.0	119
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	66.7	41.0	127
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	71.4	44.0	122
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	73.2	37.0	129
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	63.7	41.0	127
EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	66.7	42.0	122
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	79.5	31.2	117
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	58.5	38.0	120
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	119	31.4	125
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	82.6	31.2	123

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4152056) - continued								
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	86.3	24.7	125
EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4152056)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	89.4	61.0	141
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	88.5	39.0	147
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	4.4	4.10	154
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	43.2	40.0	136
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	94.6	59.0	133
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	83.2	57.0	135
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	84.8	39.0	133
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	86.8	53.0	131
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	91.4	53.0	133
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	88.2	57.0	135
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	53.9	45.0	131
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	81.4	53.0	137
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	62.6	53.0	133
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	96.6	49.0	133
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	82.5	39.0	137
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	63.1	57.0	137
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	96.9	53.0	135
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	95.8	52.0	134
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	30.6	20.4	154
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4152058)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	92.1	71.0	123
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	92.5	69.0	129
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	93.3	65.0	125
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	90.1	71.0	125
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	89.2	66.0	124
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	99.5	60.0	112
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	89.3	67.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	95.1	65.0	127
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	84.3	57.0	125
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	86.9	57.0	131
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	89.1	65.0	125
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	90.9	69.0	127

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4152058) - continued								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	81.3	63.0	121
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	72.2	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	69.0	52.0	128
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	68.4	65.0	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4152055)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	32 mg/kg	92.1	66.0	122
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4152057)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	1468 mg/kg	85.2	70.0	111
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3111 mg/kg	96.4	71.9	109
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	436 mg/kg	93.6	63.8	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4152055)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	37 mg/kg	99.0	66.0	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4152057)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	2234 mg/kg	90.6	72.8	110
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	2553 mg/kg	97.4	67.8	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	90.8	50.3	123
EP080: BTEXN (QCLot: 4152055)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	83.1	72.0	122
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	80.9	75.0	119
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	86.4	73.0	121
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	87.6	74.0	122
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	91.7	75.0	121
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	68.1	64.0	126
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4152680)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.0	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.2	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.6	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4152680)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	83.9	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.8	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.0	72.0	129

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4152680) - continued								
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.8	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.8	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.8	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	99.7	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4152680)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	99.0	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.4	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	92.1	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	95.5	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4152680)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	82.8	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	78.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	94.4	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	94.0	69.2	143

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 4149924)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	89.6	118
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.2	89.2	116
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.5	87.8	114
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.2	85.8	115
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.2	88.4	111
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.0	87.4	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.1	88.1	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4149955)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	104	85.1	115
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4149827)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	5 µg/L	86.0	36.2	90.2
EP068A: Organochlorine Pesticides (OC) (QCLot: 4149825)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4149825) - continued								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	87.7	42.3	112
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	77.5	39.0	108
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	46.4	45.5	116
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	77.7	43.0	118
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	76.2	46.2	115
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	106	39.0	111
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	81.0	39.7	114
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	50.1	42.4	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	78.4	43.6	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	74.8	42.1	129
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	76.8	42.7	123
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	87.4	42.4	121
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	73.5	43.8	123
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	75.4	26.9	127
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	65.2	44.9	128
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	80.9	41.7	128
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	56.2	32.2	121
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	47.9	40.7	120
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	81.2	31.6	123
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	60.1	36.4	124
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	82.6	25.4	124
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4149825)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	70.9	38.8	110
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	85.2	34.6	115
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	2.9	----	----
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	39.6	27.8	102
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	89.8	46.1	122
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	91.9	46.6	118
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	103	26.8	110
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	56.0	38.8	119
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	82.4	45.0	119
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	55.6	44.6	118
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	50.3	30.2	112
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	91.5	43.2	123
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	68.2	41.1	119
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	99.0	34.4	125
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	30.0	19.9	123
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	109	38.0	121
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	98.5	39.5	121

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4149825) - continued								
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	95.6	39.7	119
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	8.9	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4149826)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	48.2	41.9	99.1
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	52.9	36.1	113
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	51.3	35.8	102
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	54.2	33.5	113
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	61.9	36.5	115
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	62.1	46.4	109
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	66.4	40.4	124
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	68.6	40.2	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	55.3	40.2	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	55.0	45.6	121
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	10 µg/L	60.6	43.2	123
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	59.5	47.3	121
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	57.9	44.8	123
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	49.1	38.8	120
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	49.2	39.4	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	57.6	40.1	123
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4149824)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	381 µg/L	49.3	39.3	103
EP071: C15 - C28 Fraction	----	100	µg/L	<100	389 µg/L	60.1	47.2	122
EP071: C29 - C36 Fraction	----	50	µg/L	<50	282 µg/L	66.0	42.5	119
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4150370)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	88.2	73.6	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4149824)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	393 µg/L	49.6	42.0	104
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	507 µg/L	62.0	46.2	116
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	276 µg/L	55.5	24.7	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4150370)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	87.6	73.9	115
EP080: BTEXN (QCLot: 4150370)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	90.4	84.1	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	90.8	81.0	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	85.0	84.4	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080: BTEXN (QCLot: 4150370) - continued								
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	88.0	84.3	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	88.8	86.5	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	89.4	77.0	118
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4153130)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	89.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	95.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	92.6	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	99.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	90.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4153130)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	94.4	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	98.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	98.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	94.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	102	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	99.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	92.8	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	108	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4153130)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	107	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	119	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	104	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	108	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	114	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	90.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	104	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4153130)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	99.0	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	94.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	95.0	67.0	138

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4153130) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	82.8	71.4	144
EP262: Ethanolamines (QCLot: 4152818)								
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	92.3	50.0	130
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	82.4	50.0	130
EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	10 µg/L	98.2	50.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4152598)							
EP2201086-010	SS27_0m	EG005T: Arsenic	7440-38-2	50 mg/kg	93.6	70.0	130
		EG005T: Cadmium	7440-43-9	12.5 mg/kg	86.8	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	86.5	70.0	130
		EG005T: Copper	7440-50-8	50 mg/kg	98.4	70.0	130
		EG005T: Lead	7439-92-1	50 mg/kg	88.8	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	86.9	70.0	130
		EG005T: Zinc	7440-66-6	50 mg/kg	80.2	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4152597)							
EP2201086-010	SS27_0m	EG035T: Mercury	7439-97-6	1 mg/kg	96.1	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4152059)							
EP2201086-011	SS27_0.5m	EP066: Total Polychlorinated biphenyls	----	0.5 mg/kg	68.0	43.1	142
EP068A: Organochlorine Pesticides (OC) (QCLot: 4152056)							
EP2201086-011	SS27_0.5m	EP068: gamma-BHC	58-89-9	0.5 mg/kg	58.0	57.9	124
		EP068: Heptachlor	76-44-8	0.5 mg/kg	64.0	57.4	135
		EP068: Aldrin	309-00-2	0.5 mg/kg	83.5	59.6	125
		EP068: Dieldrin	60-57-1	0.5 mg/kg	90.5	62.2	131
		EP068: Endrin	72-20-8	0.5 mg/kg	85.1	55.8	138
		EP068: 4.4`-DDT	50-29-3	0.5 mg/kg	63.4	50.5	145
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4152056)							
EP2201086-011	SS27_0.5m	EP068: Diazinon	333-41-5	0.5 mg/kg	79.9	59.5	128
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	84.6	60.3	128
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	80.4	58.8	127
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	93.9	60.7	128

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4152056) - continued							
EP2201086-011	SS27_0.5m	EP068: Prothiofos	34643-46-4	0.5 mg/kg	99.0	60.0	129
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4152058)							
EP2201086-013	SS17_0m	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	97.9	73.5	125
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	104	70.8	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4152055)							
EP2201086-011	SS27_0.5m	EP080: C6 - C9 Fraction	----	24 mg/kg	79.5	69.1	135
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4152057)							
EP2201086-013	SS17_0m	EP071: C10 - C14 Fraction	----	1468 mg/kg	87.0	64.7	126
		EP071: C15 - C28 Fraction	----	3111 mg/kg	98.3	61.7	124
		EP071: C29 - C36 Fraction	----	436 mg/kg	92.9	64.6	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4152055)							
EP2201086-011	SS27_0.5m	EP080: C6 - C10 Fraction	C6_C10	29 mg/kg	70.9	69.1	135
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4152057)							
EP2201086-013	SS17_0m	EP071: >C10 - C16 Fraction	----	2234 mg/kg	92.2	64.7	126
		EP071: >C16 - C34 Fraction	----	2553 mg/kg	99.2	61.7	124
		EP071: >C34 - C40 Fraction	----	150 mg/kg	87.3	64.6	131
EP080: BTEXN (QCLot: 4152055)							
EP2201086-011	SS27_0.5m	EP080: Benzene	71-43-2	2 mg/kg	84.7	76.4	118
		EP080: Toluene	108-88-3	2 mg/kg	83.3	67.4	112
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4152680)							
EP2201086-010	SS27_0m	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	91.6	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	76.0	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	84.8	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	86.4	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	81.6	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	82.8	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4152680)							
EP2201086-010	SS27_0m	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	86.1	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	90.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	115	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	95.2	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	98.4	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	92.0	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	92.8	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	94.8	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	96.0	69.0	135

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4152680) - continued							
EP2201086-010	SS27_0m	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	87.2	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	100	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4152680)							
EP2201086-010	SS27_0m	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	94.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	108	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	92.9	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	98.4	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	101	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	82.0	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	94.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4152680)							
EP2201086-010	SS27_0m	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	80.8	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	76.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	88.0	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	82.4	69.2	143

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EG020T: Total Metals by ICP-MS (QCLot: 4149924)							
EP2200993-017	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	97.5	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	98.6	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	95.7	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	95.9	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	107	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	95.6	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	95.0	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4149955)							
EP2201073-001	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	97.2	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4150370)							
EP2200904-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	92.2	77.0	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4150370)							
EP2200904-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	78.4	77.0	137

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 4150370)							
EP2200904-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	107	77.0	122
		EP080: Toluene	108-88-3	20 µg/L	120	73.5	126
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4153130)							
ES2203694-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	101	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	87.6	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	95.2	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	94.6	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	94.6	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	86.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4153130)							
ES2203694-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	94.2	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	100	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	125	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	105	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	100	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	91.6	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	102	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	95.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	109	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	98.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	108	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4153130)							
ES2203694-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	101	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	115	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	104	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	106	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	101	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	96.4	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	99.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4153130)							
ES2203694-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	91.2	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	89.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	115	67.0	138

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4153130) - continued							
ES2203694-001	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	97.0	71.4	144
EP262: Ethanolamines (QCLot: 4152818)							
EP2201086-027	QC19	EP262: Ethanolamine	141-43-5	10 µg/L	63.8	50.0	130
		EP262: Diethanolamine	111-42-2	10 µg/L	# 37.7	50.0	130
		EP262: Methyl diethanolamine (MDEA)	105-59-9	10 µg/L	# 49.5	50.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201086**	Page	: 1 of 12
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman	Date Samples Received	: 01-Feb-2022
Site	: ----	Issue Date	: 08-Feb-2022
Sampler	: Nick Taylor	No. of samples received	: 29
Order number	: ----	No. of samples analysed	: 24

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP262: Ethanolamines	EP2201086--027	QC19	**Diethanolamine**	111-42-2	37.7 %	50.0-130%	**Recovery less than lower data quality objective**
EP262: Ethanolamines	EP2201086--027	QC19	**Methyl diethanolamine (MDEA)**	105-59-9	49.5 %	50.0-130%	**Recovery less than lower data quality objective**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA037: Ass Field Screening Analysis							
Snap Lock Bag							
ASS20_0m,	ASS20_0.25m,	03-Feb-2022	28-Jan-2022	**6**	03-Feb-2022	28-Jan-2022	**6**
ASS20_0.5m,	ASS20_0.75m,						
ASS20_1.0m,	ASS20_1.25m,						
ASS20_1.5m,	ASS20_1.75m,						
ASS20_2.0m,	ASS19_0m,						
ASS19_0.25m,	ASS19_0.5m						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	2	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	2	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*		*Sample Date*	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA037: Ass Field Screening Analysis								
Snap Lock Bag (EA037)								
ASS20_0m,	ASS20_0.25m,	**27-Jan-2022**	**03-Feb-2022**	28-Jan-2022	×	**03-Feb-2022**	28-Jan-2022	×
ASS20_0.5m,	ASS20_0.75m,							
ASS20_1.0m,	ASS20_1.25m,							
ASS20_1.5m,	ASS20_1.75m,							
ASS20_2.0m,	ASS19_0m,							
ASS19_0.25m,	ASS19_0.5m							
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
SS27_0m,	SS27_0.5m,	**27-Jan-2022**	**----**	----	----	**03-Feb-2022**	10-Feb-2022	✓
SS17_0m,	SS17_0.5m,							
SS16_0m,	SS16_0.5m,							
SS20_0m,	SS20_0.5m,							
SS18_0m,	SS18_0.5m							
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
SS27_0m,	SS27_0.5m,	**27-Jan-2022**	**03-Feb-2022**	26-Jul-2022	✓	**03-Feb-2022**	26-Jul-2022	✓
SS17_0m,	SS17_0.5m,							
SS16_0m,	SS16_0.5m,							
SS20_0m,	SS20_0.5m,							
SS18_0m,	SS18_0.5m							
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
SS27_0m,	SS27_0.5m,	**27-Jan-2022**	**03-Feb-2022**	24-Feb-2022	✓	**03-Feb-2022**	24-Feb-2022	✓
SS17_0m,	SS17_0.5m,							
SS16_0m,	SS16_0.5m,							
SS20_0m,	SS20_0.5m,							
SS18_0m,	SS18_0.5m							
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066)								
SS27_0m,	SS27_0.5m	**27-Jan-2022**	**03-Feb-2022**	10-Feb-2022	✓	**04-Feb-2022**	15-Mar-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068) SS27_0m, SS27_0.5m	**27-Jan-2022**	**03-Feb-2022**	10-Feb-2022	✓	**04-Feb-2022**	15-Mar-2022	✓
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068) SS27_0m, SS27_0.5m	**27-Jan-2022**	**03-Feb-2022**	10-Feb-2022	✓	**04-Feb-2022**	15-Mar-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) SS27_0m, SS27_0.5m, SS17_0m, SS17_0.5m	**27-Jan-2022**	**03-Feb-2022**	10-Feb-2022	✓	**04-Feb-2022**	15-Mar-2022	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) SS27_0m, SS27_0.5m, SS17_0m, SS17_0.5m	**27-Jan-2022**	**03-Feb-2022**	10-Feb-2022	✓	**03-Feb-2022**	10-Feb-2022	✓
Soil Glass Jar - Unpreserved (EP071) SS27_0m, SS27_0.5m, SS17_0m, SS17_0.5m	**27-Jan-2022**	**03-Feb-2022**	10-Feb-2022	✓	**04-Feb-2022**	15-Mar-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) SS27_0m, SS27_0.5m, SS17_0m, SS17_0.5m	**27-Jan-2022**	**03-Feb-2022**	10-Feb-2022	✓	**03-Feb-2022**	10-Feb-2022	✓
Soil Glass Jar - Unpreserved (EP071) SS27_0m, SS27_0.5m, SS17_0m, SS17_0.5m	**27-Jan-2022**	**03-Feb-2022**	10-Feb-2022	✓	**04-Feb-2022**	15-Mar-2022	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) SS27_0m, SS27_0.5m, SS17_0m, SS17_0.5m	**27-Jan-2022**	**03-Feb-2022**	10-Feb-2022	✓	**03-Feb-2022**	10-Feb-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) SS27_0m, SS27_0.5m, SS17_0m, SS17_0.5m, SS16_0m	**27-Jan-2022**	**03-Feb-2022**	26-Jul-2022	✓	**04-Feb-2022**	15-Mar-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) SS27_0m, SS27_0.5m, SS17_0m, SS17_0.5m, SS16_0m	**27-Jan-2022**	**03-Feb-2022**	26-Jul-2022	✓	**04-Feb-2022**	15-Mar-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) SS27_0m, SS27_0.5m, SS17_0m, SS17_0.5m, SS16_0m	**27-Jan-2022**	**03-Feb-2022**	26-Jul-2022	✓	**04-Feb-2022**	15-Mar-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) SS27_0m, SS27_0.5m, SS17_0m, SS17_0.5m, SS16_0m	**27-Jan-2022**	**03-Feb-2022**	26-Jul-2022	✓	**04-Feb-2022**	15-Mar-2022	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) SS27_0m, SS27_0.5m, SS17_0m, SS17_0.5m, SS16_0m	**27-Jan-2022**	**03-Feb-2022**	26-Jul-2022	✓	**04-Feb-2022**	15-Mar-2022	✓
EP262: Ethanolamines							
Soil Glass Jar - Unpreserved (EP262) SS17_0m, SS17_0.5m, SS16_0m, SS16_0.5m	**27-Jan-2022**	**----**	----	----	**04-Feb-2022**	10-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T) QC19	**27-Jan-2022**	**02-Feb-2022**	26-Jul-2022	✓	**02-Feb-2022**	26-Jul-2022	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG035T) QC19	**27-Jan-2022**	**----**	----	----	**03-Feb-2022**	24-Feb-2022	✓
EP066: Polychlorinated Biphenyls (PCB)							
Amber Glass Bottle - Unpreserved (EP066) QC19	**27-Jan-2022**	**02-Feb-2022**	03-Feb-2022	✓	**04-Feb-2022**	14-Mar-2022	✓
EP068A: Organochlorine Pesticides (OC)							
Amber Glass Bottle - Unpreserved (EP068) QC19	**27-Jan-2022**	**02-Feb-2022**	03-Feb-2022	✓	**04-Feb-2022**	14-Mar-2022	✓
EP068B: Organophosphorus Pesticides (OP)							
Amber Glass Bottle - Unpreserved (EP068) QC19	**27-Jan-2022**	**02-Feb-2022**	03-Feb-2022	✓	**04-Feb-2022**	14-Mar-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) QC19	**27-Jan-2022**	**02-Feb-2022**	03-Feb-2022	✓	**04-Feb-2022**	14-Mar-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
QC19, QC20	**27-Jan-2022**	**02-Feb-2022**	03-Feb-2022	✓	**04-Feb-2022**	14-Mar-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
QC19, QC20	**27-Jan-2022**	**02-Feb-2022**	10-Feb-2022	✓	**02-Feb-2022**	10-Feb-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
QC19, QC20	**27-Jan-2022**	**02-Feb-2022**	03-Feb-2022	✓	**04-Feb-2022**	14-Mar-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
QC19, QC20	**27-Jan-2022**	**02-Feb-2022**	10-Feb-2022	✓	**02-Feb-2022**	10-Feb-2022	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
QC19, QC20	**27-Jan-2022**	**02-Feb-2022**	10-Feb-2022	✓	**02-Feb-2022**	10-Feb-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
QC19	**27-Jan-2022**	**03-Feb-2022**	26-Jul-2022	✓	**04-Feb-2022**	26-Jul-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
QC19	**27-Jan-2022**	**03-Feb-2022**	26-Jul-2022	✓	**04-Feb-2022**	26-Jul-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
QC19	**27-Jan-2022**	**03-Feb-2022**	26-Jul-2022	✓	**04-Feb-2022**	26-Jul-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
QC19	**27-Jan-2022**	**03-Feb-2022**	26-Jul-2022	✓	**04-Feb-2022**	26-Jul-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
QC19	**27-Jan-2022**	**03-Feb-2022**	26-Jul-2022	✓	**04-Feb-2022**	26-Jul-2022	✓
EP262: Ethanolamines							
Amber Bottle Unpreserved for Specialist Organics (EP262)							
QC19	**27-Jan-2022**	**----**	----	----	**03-Feb-2022**	03-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
TRH Volatiles/BTEX	EP080	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ethanolamines by LCMSMS	EP262	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	2	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ethanolamines by LCMSMS	EP262	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ethanolamines by LCMSMS	EP262	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ethanolamines by LCMSMS	EP262	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Polychlorinated Biphenyls (PCB)	EP066	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	2	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines in Soils	EP262	SOIL	In House: 2g of soil is extracted into 10 mL of water then analysed by analysed by LC/MSMS in ESI Positive Mode.

Analytical Methods	Method	Matrix	Method Descriptions
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines by LCMSMS	EP262	WATER	In house: LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.

Preparation Methods	Method	Matrix	Method Descriptions
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201790**	Page	: 1 of 4
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman Contam and ASS	Date Samples Received	: 16-Feb-2022 11:30
Order number	: ----	Date Analysis Commenced	: 16-Feb-2022
C-O-C number	: ----	Issue Date	: 18-Feb-2022 14:36
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
~ = Indicates an estimated value.

- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS22_0	ASS22_0.25	ASS22_0.5	ASS22_0.75	ASS22_1.0
			Sampling date / time	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201790-001	EP2201790-002	EP2201790-003	EP2201790-004	EP2201790-005
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.0**	**8.2**	**8.8**	**8.4**	**8.5**
pH (Fox)	----	0.1	pH Unit	**6.6**	**7.7**	**8.6**	**8.3**	**8.6**
Reaction Rate	----	1	-	**Extreme**	**Extreme**	**Extreme**	**Extreme**	**Extreme**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	ASS22_1.25	ASS22_1.5	ASS22_1.75	ASS22_2.0	----
			Sampling date / time	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00	12-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201790-006	EP2201790-007	EP2201790-008	EP2201790-009	--------
				Result	Result	Result	Result	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**8.6**	**8.3**	**8.5**	**9.0**	**----**
pH (Fox)	----	0.1	pH Unit	**8.8**	**7.9**	**8.4**	**7.5**	**----**
Reaction Rate	----	1	-	**Extreme**	**Extreme**	**Extreme**	**Extreme**	**----**

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2201790**	Page	: 1 of 3
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman Contam and ASS	Date Samples Received	: 16-Feb-2022
Order number	: ----	Date Analysis Commenced	: 16-Feb-2022
C-O-C number	: ----	Issue Date	: 18-Feb-2022
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA037: Ass Field Screening Analysis (QC Lot: 4182380)									
EP2201790-001	ASS22_0	EA037: pH (F)	----	0.1	pH Unit	8.0	8.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.6	6.6	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

- **No Method Blank (MB) or Laboratory Control Spike (LCS) Results are required to be reported.**

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201790**	Page	: 1 of 4
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman Contam and ASS	Date Samples Received	: 16-Feb-2022
Site	: ----	Issue Date	: 18-Feb-2022
Sampler	: SANJANA AUDIT	No. of samples received	: 9
Order number	: ----	No. of samples analysed	: 9

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / ***Container*** / *Client Sample ID(s)*		***Sample Date***	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen on receipt at ALS (EA037)								
ASS22_0,	ASS22_0.25,	**12-Feb-2022**	**16-Feb-2022**	11-Aug-2022	✓	**16-Feb-2022**	11-Aug-2022	✓
ASS22_0.5,	ASS22_0.75,							
ASS22_1.0,	ASS22_1.25,							
ASS22_1.5,	ASS22_1.75,							
ASS22_2.0								

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
ASS Field Screening Analysis	EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Drying only	EN020D	SOIL	In house

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office: Tetra Tech Coffey - Perth

Report Results to: Bernie Weekes Mobile: 407817762 Email: bernie.weekes@coffey.com

Invoices to: accounts.perth@tetratech.com Phone: Email: @tetratech.com

Project No: 754-PEREN295751 Task No:

Project Name: Perdaman Contam and ASS Laboratory: ALS

Sampler's Name: Sanjana Audit Project Manager: Bernie Weekes

Quote number (if different to current quoted prices):

Special Instructions: 48hr tat required

Analysis Request Section

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	EA037	EA029	EA033										NOTES
1	ASS22_0	12.2.22	PM	Soil	1Z	5-days	X												
2	ASS22_0.25	12.2.22	PM	Soil	1Z	5-days	X												
3	ASS22_0.50	12.2.22	PM	Soil	1Z	5-days	X												
4	ASS22_0.75	12.2.22	PM	Soil	1Z	5-days	X												
5	ASS22_1.0	12.2.22	PM	Soil	1Z	5-days	X												
6	ASS22_1.25	12.2.22	PM	Soil	1Z	5-days	X												
7	ASS22_1.50	12.2.22	PM	Soil	1Z	5-days	X												
8	ASS22_1.75	12.2.22	PM	Soil	1Z	5-days	X												
9	ASS22_2.0	12.2.22	PM	Soil	1Z	5-days	X												

Environmental Division Perth
Work Order Reference
EP2201790
Telephone : -- 61-8-9406 1301

RELINQUISHED BY		RECEIVED BY	
Name: Sanjana Audit 14.2.22	Date:	Name:	Date: 16/2
Coffey	Time:	Company: ALS	Time: 1130
Name:	Date:	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐

All Documentation is in Proper Order ☐

Samples Received Properly Chilled ☐

Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

Attachment I – Tetra Tech Coffey 2022b Baseline Hydrogeological Assessment (for Clough).

Perdaman Urea Project - Project Destiny

Baseline Hydrogeological Assessment

Clough Engineering Pty Ltd

Reference: 754-PEREN296568

10 March 2022

PERDAMAN UREA PROJECT - PROJECT DESTINY

Baseline Hydrogeological Assessment

Report reference number: 754-PEREN296568
09 March 2022

PREPARED FOR

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QUALITY INFORMATION

Revision history

Revision	Description	Date	Author	Reviewer	Approver
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Draft B	Draft for Client & Peer Review	09/03/2022	NT	CB	CB
Draft C	Draft for Client & Peer Review - Revised	10/03/2022	NT	CB	CB

Distribution

Report Status	No. of copies	Format	Distributed to	Date
Draft C	1	PDF	Clough/Senversa	10/03/2022

Restriction on Disclosure and Use of Data
Insert disclaimer here. If disclaimer statement is long, or if there are multiple disclaimers, text will flow to second page.

EXECUTIVE SUMMARY[1]

Tetra Tech Coffey Pty Ltd (Tetra Tech) was engaged by Clough to provide a Baseline Hydrogeological Assessment for input into a Final Investment Decision (FID) for 'Project Destiny' which consists of a proposed Perdaman Urea Plant (PUP) on the Burrup Peninsula in the Pilbara Region of Western Australia. The Site will consist of a urea production plant on a consolidated site of 71.13 ha in size with a nominal production capacity of about 2 million tonnes per annum (Mtpa) on Sites C and F within the Burrup Strategic Industrial Area (BSIA) on the Burrup Peninsula, approximately 8 km north-east of Dampier and 20 km north-west of Karratha.

As part of working towards an FID a number of environmental assessments are required to meet conditions associated with the Lease Agreement between Perdaman and DevelopmentWA as well as formal Conditions issued by the Environmental Protection Authority (EPA) within Ministerial Statement MS1705 under Part IV of the Environmental Protection Act, 1986.

Clough have requested Tetra Tech Coffey Pty Ltd (Tetra Tech) undertake the works required to meet the requirements of the Lease Agreement for a Baseline Report, in accordance with the definition contained within the lease documents and comply with Condition 6 of MS1705 for Hydrogeological Management.

In 2020 Coffey was engaged by Clough to complete a geotechnical investigation at the Site. The geotechnical investigation was undertaken to determine soil, rock and groundwater conditions for foundation support, excavatability of soil ground for bulk earthworks, floor slab subgrade and design parameters, geotechnical parameters for foundation design, suitable deep foundations and parameters for design, bearing capacity for foundations, and other design parameters for construction (Coffey 2020). And after this a Supplementary Geotechnical Report (Tetra Tech 2021) was prepared to present additional geotechnical reporting as part of review of the project earthworks by JDSi Consulting Engineers (JDSi) for Clough. During these works, 4 geotechnical investigation holes were converted for use as groundwater monitoring wells.

Now in 2021-2022, Clough have requested Tetra Tech undertake the works required to meet the requirements of the Lease Agreement for a Baseline Report, in accordance with the definition contained within the lease documents and comply with Condition 6 of MS1705 for Hydrogeological Management.

The overarching objective of this assessment is to provide Clough with the initial baseline groundwater conditions for the Perdaman site, which can be used as a basis for assessing the potential effects of the development on the resource during construction. It can also be used for determining suitable management measures to minimise or prevent impacts to groundwater so that environmental values are protected.

The assessment will also allow Perdaman to meet specific conditions associated with the Lease Agreement between itself and DevelopmentWA, as well as formal Conditions issued by the Environmental Protection Authority (EPA) within Ministerial Statement MS1705 under Part IV of the *Environmental Protection Act, 1986*.

The Scope of Works for the hydrogeological assessment consisted of the following:

- Design, drilling and construction of an additional 10 groundwater monitoring wells to allow sufficient aerial coverage across both areas of the site to determine baseline groundwater conditions;
- Logging of soils and rock to advise well design and completion;
- Surveying of wells to ensure accuracy of location so that accurate groundwater levels in mAHD may be derived for use in determining a CSM;
- Undertake a Groundwater Monitoring Event (GME) on all 14 monitoring well locations to ascertain groundwater levels, flow direction, baseline groundwater quality and hydrogeochemistry to assess the level of connection between aquifer units, potential contaminant flow behaviour and risks to

[1] This executive summary must be read in the context of the full report and the attached limitations.

groundwater and identified receptors from potential contamination both off-site and during construction;

- Formulation of a preliminary CSM for use in informing engineering design, monitoring and compliance activities and, if necessary, for use in future numerical groundwater modelling if necessary; and
- Recommendations for further work to manage groundwater resources and address any data gaps.

Based on the investigations undertaken, the following can be concluded:

- The CSM identifies two hydrostratigraphic units beneath the site consisting of a low yielding granophyre bedrock aquifer overlain by a shallow superficial aquifer consisting of a variety of deposits including clays, gravels and calcrete. Both units are unconfined and hydraulically connected.
- Groundwater flow is to the southwest in Site C and to the northwest on Site F, with discharge to the supratidal area and eventually into King Bay to the west. Groundwater is influenced by tidal variations and it is likely that flow direction is altered during periods of high tides.
- The depth to groundwater varies between 0.41 mBTOC and 21.61 mBTOC with surface waters being an expression of groundwater in the supratidal area during periods of groundwater in the supratidal area during periods of high rainfall and following tidal inundation.
- Groundwater in both the granophyre and superficial deposits is of Na-K-Cl type andis brackish to saline in nature with the superficial deposits being significantly more saline due to direct tidal interaction.
- Due to either the low yielding nature of the aquifer (granophyre aquifer) or the high level of salinity (superficial aquifer) groundwater in the area is considered to be of limited beneficial use and environmental value other than for industrial use or supporting marine ecosystems.
- It is understood that no dewatering is to occur during construction and therefore, there is no risk of impacts to groundwater, surrounding groundwater users and the environment from abstraction. However, if dewatering and/or general abstraction are planned, the current monitoring network may be used to gain further data on the groundwater regime (i.e. from aquifer testing) that maybe then used in future analyses (i.e. modelling) to further assess any impacts to the surrounding environment.
- Contamination in groundwater is localised and unlikely to pose a significant risk to surrounding receptors due to the low yield of the granophyre aquifer, which will greatly retard contaminant flow. Other contamination identified within surface water and groundwater (PFAS and Nutrients) are likely to be derived from off-site upgradient sources, (YPN plant).
- The current groundwater monitoring network is considered adequate for assessing both groundwater level and quality variations through time. A groundwater quality monitoring program should be provided to ensure that any impacts during and following development are identified and, if necessary, managed or mitigated.

Based on the conclusions, we make the following recommendations:

- If dewatering is required, further investigations should take place with associated groundwater modelling work, if necessary, to ascertain the effects on the environment and to develop suitable management measures to prevent impacts on the surrounding environment and to protect environmental values.
- A monitoring program should be developed which will both further refine the baseline dataset to inform management measures for groundwater and to reflect the relevant conditions of any pollution control licence under the Environmental Protection Act 1986 or similar. The monitoring program should be used to assess groundwater conditions and identify potential impacts both during development and site operations so that any impacts may be managed or mitigated.

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APPENDIX A: BORELOGS AND SURVEY DATA .....

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APPENDIX D: LABORATORY CERTIFICATES .....

APPENDIX E: WATER QUALITY RESULTS .....

ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
AASS	Actual Acid Sulfate Soil
AEC	Area of Environmental Concern
aMDEA	Methyl diethanolamine
mAHD	meters Australian Height Datum
AHIS	Aboriginal Heritage Inquiry System
aMDEA	Methyl diethanolamine
ASRIS	Australian Soil Resource Information System
ASS	Acid Sulfate Soil
BSIA	Burrup Strategic Industrial Area
BSR	Basic Summary of Record
mBGL	meters Below ground level
CoPC	Contaminant of Potential Concern
CoT	Certificate of Title
CS	Contaminates Sites
CS Act	Contaminated Sites Act
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSM	Conceptual Site Model
DCW	Dampier Cargo Wharf
DMIRS	Department of Mines, Industry regulation and Safety
DSR	Detailed Search Records
DWER	Department of Water and Environmental Regulation
EIA	Environmental Impact Assessment
EPA WA	Western Australian Environmental Protection Authority
EP Act	Environmental Protection Act 1986
ERD	Environmental Review Document
FID	Final Investment Decision
JDSi	JDSi Consulting Engineers
LoC	Loss of Containment
MAC	Murujuga Aboriginal Corporation
mBTOC	Metres below top of casing
mBGL	Metres below ground level
Mtpa	million tonnes per annum
NEPC	National Environmental Protection Council
NEPM	National Environmental Protection Measure
NGOs	Non-Governmental Organisations

PAH	Polycyclic Aromatic Hydrocarbons
PASS	Potential Acid Sulfate Soil
PCB	Polychlorinated biphenyls
PCIR	Potentially Contaminated Investigation Required
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
PoD	Port of Dampier
PSI	Preliminary Site Investigation
PUP	Perdaman Urea Plant
PSP	Port Services Precinct
SoW	Scope of Work
SPR	Source, Pathway, Receptor
TEC	Threatened Ecological Community
TO	Traditional Owner
TPH	Total Petroleum Hydrocarbons
WIR	Water Information Reporting
WRC	Water Resources Council
YPN	Yara Pilbara Nitrate

1. INTRODUCTION

Tetra Tech Coffey Pty Ltd (Tetra Tech) was engaged by Clough to provide a Baseline Hydrogeological Assessment for input into a Final Investment Decision (FID) for 'Project Destiny' which consists of a proposed Perdaman Urea Plant (PUP) on the Burrup Peninsula in the Pilbara Region of Western Australia. The Site will consist of a urea production plant on a consolidated site of 71.13 ha in size with a nominal production capacity of about 2 million tonnes per annum (Mtpa) on Sites C and F within the Burrup Strategic Industrial Area (BSIA) on the Burrup Peninsula, approximately 8 km north-east of Dampier and 20 km north-west of Karratha.

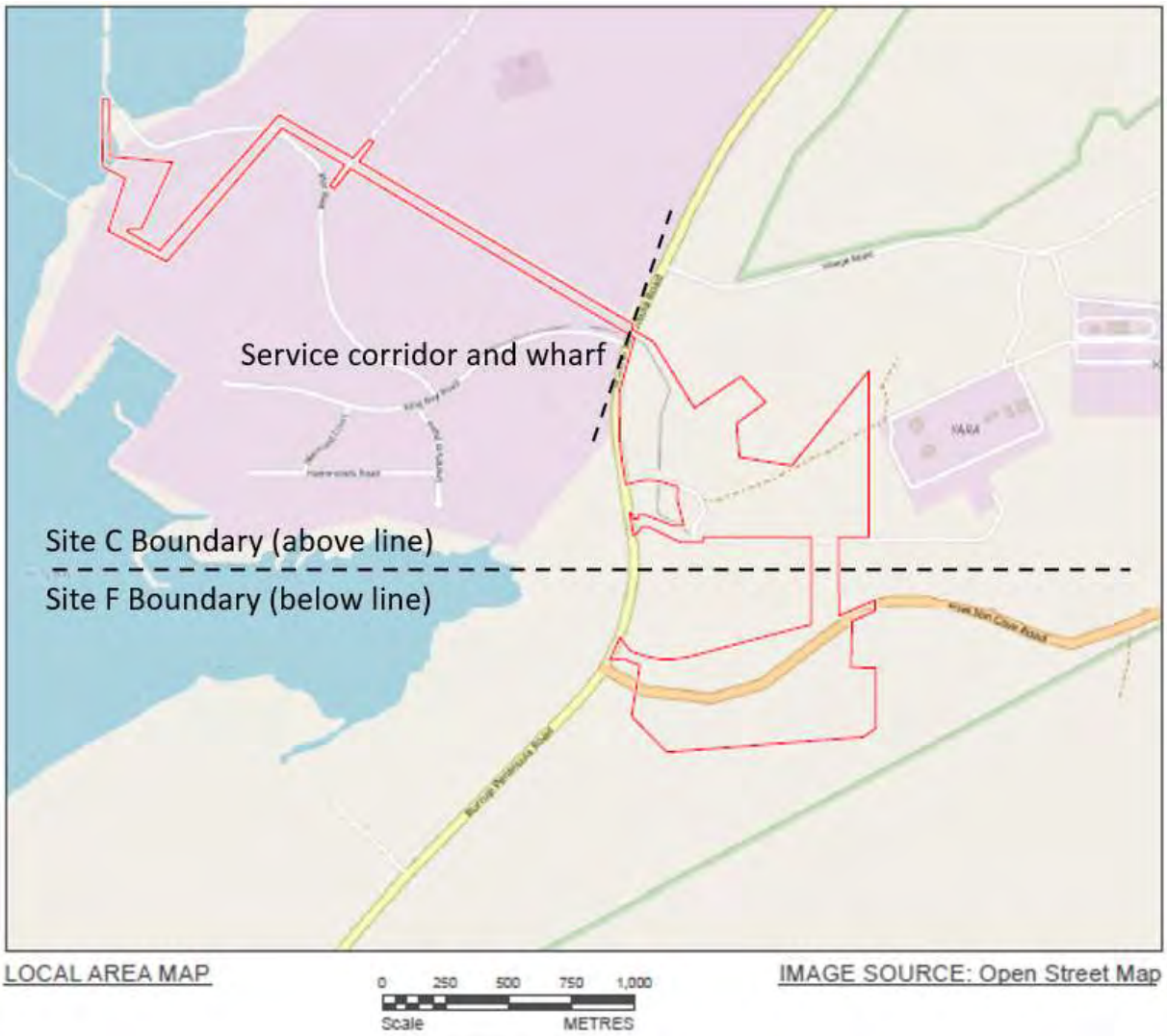
The purpose of this assessment is to quantify a baseline in regard to hydrogeological conditions on site, including groundwater levels, groundwater quality and groundwater flow direction for both areas of the site (Site C and Site F). This may then be used to minimise project attributable impacts on groundwater quality, flow direction and/or levels to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected. This assessment has been written to meet the requirements of the following guidance:

- Government of Western Australia, Department of Water, 2009: Operational policy no. 5.12 – Hydrogeological reporting associated with a groundwater well licence.
- EPA Victoria, 2006: Hydrogeological Assessment (Groundwater Quality) Guidelines.

Figure A shows inferred site boundaries of key plant infrastructure and non-process areas that will be developed in proximity to existing heavy industrial infrastructure in the Burrup, Western Australia. The baseline hydrogeological assessment excludes the service corridor extending from Site C to the wharf and the port itself but incorporates the entire supratidal area between both Site C and Site F with consideration to land uses and activities upgradient of groundwater flow as well as potential downgradient receptors or those likely to be impacted in the wider area by any potential abstraction and/or dewatering activities.

This report should be read in conjunction with the Baseline Contamination Assessment – Detailed Site Investigation undertaken by Tetra Tech Coffey, (Tetra Tech Coffey 2022c) the Preliminary Site Investigation undertaken by Tetra Tech Coffey (Tetra Tech Coffey 2022a) and the Sampling, Analysis & Quality Plan undertaken by Tetra Tech Coffey (Tetra Tech Coffey 29022b).

Figure A: Site Locality Plan (Site C and Site F)



An overall location map in shown in Figure 1 and a consolidated site locality map presenting notable site features, topographic information, land use and tenure information is presented in Figure 2. The site is currently empty and consists of two areas of native bushland to the north and south, separated by a supertidal area within the centre of the site. A large section of Site F was previously cleared and used as a laydown area for construction of the nearby port however, no other development is known to have taken place historically. The Yara Pilbara Nitrates plant is situated immediately east of the Site C area. Topographically, both Site C and Site F slope down toward the supertidal flats, which discharge into King Bay to the West. There is a sharp decline of 2-3 metres at the edges of the supertidal flats caused by tidal erosion of sedimentary deposits including calcrete. At times of significantly high tide and storm events surface waters are known to extend across the supertidal flats to the East and across the peninsula to discharge at Hearson's Cove.

1.1 BACKGROUND

Project Destiny has been awarded 'Project of State Significance' status by the Western Australian State Government, which is set to kick start a new wave of local manufacturing in the State creating local jobs and supporting the local community in the Karratha and Dampier region. The PUP will be Australia's first urea

export project supplying the growing Asia Pacific demand and where possible, will invest in the employment of the local workforce.

An agreement between Perdaman Industries (Chemical & Fertilisers) and the Western Australian Land Authority (WALA) has been reached to lease Site C and Site F for a period of 40 years which will allow Perdaman Industries to establish an export plant which will make a positive contribution to the Western Australian economy.

The Burrup Strategic Industrial Area (BSIA) is a well-established strategic industrial estate with vacant land for strategic heavy industry near gas, port, and other key infrastructure in the Pilbara region. Perdaman's FID will support the development goals of DevelopmentWA in line with the Burrup SIA and precinct land use and development strategies of the Port of Dampier including:

- Extend the life of the Dampier Cargo Wharf (DCW)
- Extension of the DCW
- Maximise space for laydown areas in the Port Services Precinct (PSP)
- Support the development of future pipeline corridors
- Maximise the use of the Burrup Services Corridor.

As part of working towards an FID a number of environmental assessments are required to meet conditions associated with the Lease Agreement between Perdaman and DevelopmentWA as well as formal Conditions issued by the Environmental Protection Authority (EPA) within Ministerial Statement MS1705 under Part IV of the Environmental Protection Act, 1986.

Clough have requested Tetra Tech Coffey Pty Ltd (Tetra Tech) undertake the works required to meet the requirements of the Lease Agreement for a Baseline Report, in accordance with the definition contained within the lease documents and comply with Condition 6 of MS1705 for Hydrogeological Management.

In 2020 Coffey was engaged by Clough to complete a geotechnical investigation at the Site. The geotechnical investigation was undertaken to determine soil, rock and groundwater conditions for foundation support, excavatability of soil ground for bulk earthworks, floor slab subgrade and design parameters, geotechnical parameters for foundation design, suitable deep foundations and parameters for design, bearing capacity for foundations, and other design parameters for construction (Coffey 2020). And after this a Supplementary Geotechnical Report (Tetra Tech 2021) was prepared to present additional geotechnical reporting as part of review of the project earthworks by JDSi Consulting Engineers (JDSi) for Clough. During these works, 4 geotechnical investigation holes were converted for use as groundwater monitoring wells.

Now in 2021-2022, Clough have requested Tetra Tech undertake the works required to meet the requirements of the Lease Agreement for a Baseline Report, in accordance with the definition contained within the lease documents and comply with Condition 6 of MS1705 for Hydrogeological Management.

1.2 OBJECTIVES

The overarching objective of this assessment is to provide Clough with the initial baseline groundwater conditions for the Perdaman site, which can be used as a basis for assessing the potential effects of the development on the resource during construction. It can also be used for determining suitable management measures to minimise or prevent impacts to groundwater so that environmental values are protected.

The assessment will also allow Perdaman to meet specific conditions associated with the Lease Agreement between itself and DevelopmentWA, as well as formal Conditions issued by the Environmental Protection Authority (EPA) within Ministerial Statement MS1705 under Part IV of the *Environmental Protection Act, 1986*.

1.2.1 Technical Objectives

The technical objectives of the assessment include the following:

- Undertaken a desktop study to establish the hydrogeological conditions on site based on publicly available information;
- Design and install a groundwater monitoring network to allow an initial assessment of hydrogeological conditions on site including groundwater levels, flow direction and groundwater quality with the aim of developing a hydrogeological conceptual model of the site;
- Assess the risks to groundwater and identified receptors from potential contamination and activities such as dewatering;
- Design a monitoring program that can be used prior to and during the construction program to assess whether baseline conditions are being impacted; and
- Provide a basis for management and environmental advice on groundwater during the FID and engineering design phases of the project.

1.3 SCOPE OF WORKS

The SoW extends over two main site areas situated to the north and south of a mangrove creek line and supratidal zone. The two site areas are referred to as Site C and Site F and will be connected by a causeway traversing the supratidal zone. Site C will be the location of a proposed Ammonia and Urea plant, while Site F will be for Non-Process Infrastructure.

Site C is situated adjacent to the existing Yara Pilbara Ammonia Plant which is immediately west of the proposed Site C development area with a process infrastructure transfer pipeline alignment running along the southern boundary of Site C.

The intertidal zone, which separates Site C and Site F, extends between the mangrove community on the edge of King Bay inlet and east along the tidal creek line to the alluvial plain at Hearson's Cove and is mapped as 'high risk of Acid Sulfate Soils within 3 metres of the natural surface' as displayed on the Australian Soil Resource Information System (ASRIS) developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in 2014.

The Scope of Works for the hydrogeological assessment consisted of the following:

- Design, drilling and construction of an additional 10 groundwater monitoring wells to allow sufficient aerial coverage across both areas of the site to determine baseline groundwater conditions;
- Logging of soils and rock to advise well design and completion;
- Surveying of wells to ensure accuracy of location so that accurate groundwater levels in mAHD may be derived for use in determining a CSM;
- Undertake a Groundwater Monitoring Event (GME) on all 14 monitoring well locations to ascertain groundwater levels, flow direction, baseline groundwater quality and hydrogeochemistry to assess the level of connection between aquifer units, potential contaminant flow behaviour and risks to groundwater and identified receptors from potential contamination both off-site and during construction;
- Formulation of a preliminary CSM for use in informing engineering design, monitoring and compliance activities and, if necessary, for use in future numerical groundwater modelling if necessary; and
- Recommendations for further work to manage groundwater resources and address any data gaps.

2. SITE SETTING

2.1 TOPOGRAPHY

Large outcrops and ranges of fractured red boulder slopes dominate the rugged landscape of the Burrup Peninsula. The land is elevated from the typically low and flat coastal plains of the west Pilbara. There are numerous gorges, creeks and drainage lines cutting across the landscape, which provide variety in the landscape. This landscape is distinctive in its appearance and is restricted to the Burrup Peninsula and some nearby islands and adjacent mainland. In overall morphology, the Burrup Peninsula is divided into two sections.

Between Hearson Cove and King Bay, a low-lying expanse of supratidal mud flat and sand dunes, between one and two kilometres wide, effectively separating the northern and southern elevated rocky sections of the Peninsula. Tidal mud flats characterise the sheltered bays along both eastern and western coasts of the Peninsula including northern Conzinc Bay, Hearson Cove, Cowrie Cove and Watering Cove (Cardno, 2019).

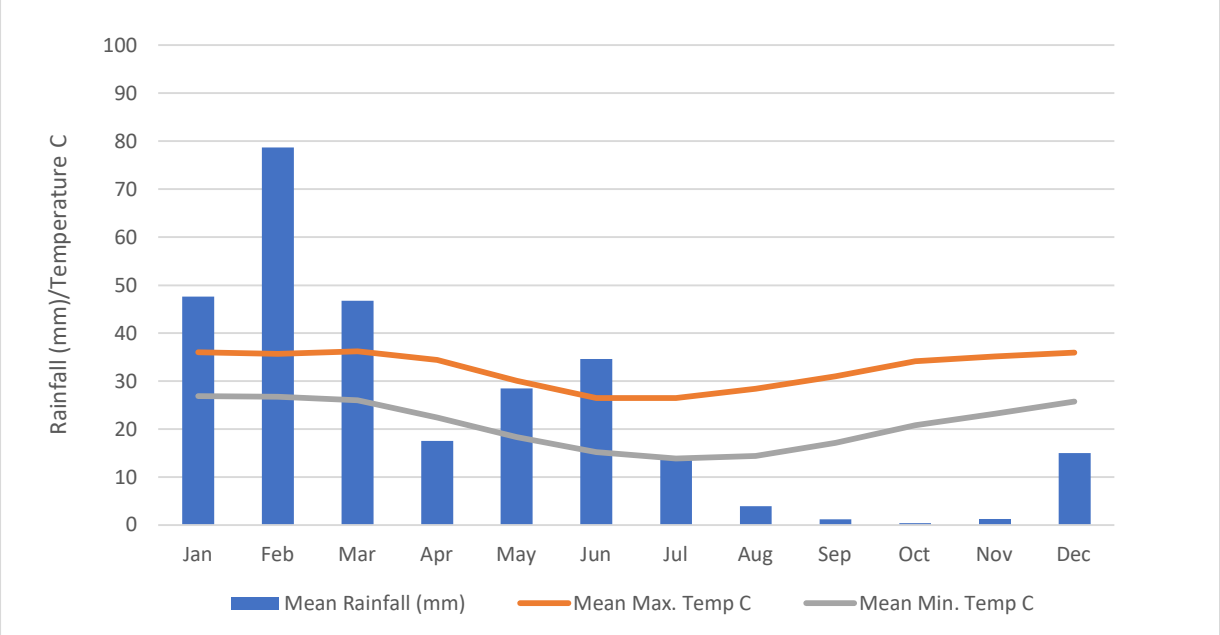
The following broad landscape character types can be found at or near the project site:

- Coastline – the Burrup Peninsula coastline and the waters of the Dampier Archipelago and the Indian Ocean, including the bays (Kings Bay, Withnell Bay, Conzinc and Hearson's Cove), Dampier Islands (approximately 54) and the foredunes, mangroves and sandy beaches;
- Lowlands – drainage channels and 'narrow valleys', scrublands, and the supratidal flats;
- Rocky outcrops – the steep rugged rock scree slopes in the north and south of the peninsula; and
- Industry/Urban – including the Burrup Strategic Industrial Area (BSIA) and the Dampier Port and wharves, industrial islands of Dampier and Karratha townships.

2.2 CLIMATE

The Burrup Peninsula and Karratha area have a semi-arid climate with tropical savannah climatic influence. The general seasonal characteristics comprise of hot summers with periodic heavy rains (October to March) and milder winters with occasional rainfall (April to September). Overall however, annual conditions are relatively dry with a mean maximum rainfall of 297.6mm. Mean monthly maximum temperature is 32.5°C with the highest temperatures recorded in March and the mean minimum temperature is 20.9°C with the lowest monthly mean temperature recorded in July. Tropical cyclones occur between December to April with winds up to 250 km/hr, heavy swells, and torrential rain likely (SKM, 2011). A graph of mean monthly rainfall and temperature is presented below (Graph 1).

Graph 1: Rainfall & Temperature (BoM Station No. 004083 - Karratha Aero)



2.3 GEOLOGY

2.3.1 Regional Geology

A regional geology map is presented in Figure 3. The 1:500,000 Interpreted Bedrock geology map (Geological Survey of Western Australia, 2016) indicated that the site is underlain by Gidley Granophyre described as fine to medium-grained granophyre, commonly porphyritic and underlain by gabbro.

The surface geology of the site is described by Geoscience Australia 1:250,000 Dampier geological map sheet as Quaternary (Qc and Qs) and detailed as:

- Colluvium – sand, silt and gravel in outwash fans, scree and talus, proximal mass-wasting deposits;
- Aeolian sand – red-yellow, wind-blown sand, local sand ridges; and
- Dolerite and Gabbro dykes may also occur.

Saline flats are in a sediment filled strait between King Bay and Hearson Cove. The soils of the mudflat area are typically alkaline due to the high carbonate content originating from marine sand and underlying calcrete bedrock.

2.3.2 Site Geology

Geological mapping of the area shows the site to be underlain by Colluvium of sand, silt, and gravel, which is in turn underlain by the Gidley Granophyre. The supratidal areas are shown to be underlain by silt and mud in supratidal and intertidal lagoons. These are represented by outwash fans that have a soil profile associated with a low energy marine depositional environment. These sediments are typically organically rich and often contain a thin vaneer of shelly lenses. A curved thrust fault extends through Site C, which generally reflects topography.

The granophyre is the dominant rock type, which is characterised by extremely high intact rock strength. When exposed to weathering, the rock surface forms a characteristic surface of boulders that may become loose from the rock mass. Previous investigations near site indicated a greater degree of weathering than

normal for this unit, which is consistent to its proximity to an incised channel. Recent investigations undertaken by Tetra Tech Coffey revealed the following succession:

- Fill: Gravelly clayey sand, mixture of granophyre and calcrete gravel. Difficult to establish boundary of fill and underlying colluvial gravel. It is understood that these are present mainly across the north-western area of Site F.
- Intertidal deposits: Loose sand, pale brown, calcareous with shells and soft to very soft clay. These intertidal deposits are mainly sand or a mixture of sand and calcrete gravel. Clay layers are located toward the centre of the tidal flats.
- Calcrete (tidal area) pale grey to red or gravel, vughy.
- Colluvial gravel: clayey gravel present across majority of site, which includes granophyre boulders.
- Weathered granophyre, present across areas of the site.
- Brecciated/Cemented Granophyre: Secondary cementation by CaCO3, not uniformly distributed, mainly found on colluvial slopes adjacent to the tidal flats.
- Fresh Granophyre.
- Dolerite: Extremely weathered to residual clayey gravel, present in localised areas in the northern area of Site C.

2.4 HYDROGEOLOGY

2.4.1 Regional Hydrogeology

The main aquifer in the area is the Pilbara Fractured Rock Aquifer consisting of Precambrain granite-greenstone terrain overlain by superficial sediments in river valleys. These fractured aquifers are usually of low permeability with limited storage with yields controlled by the position, extent and size of fracturing. Superficial sediments may act as perched aquifer bodies where geological conditions allow this.

2.4.2 Site Hydrogeology

In the site area, the main aquifer bodies consist of the Gidley Granophyre bedrock aquifer, which is overlain by supratidal deposits. These are both considered to be unconfined in nature and in hydraulic connection with groundwater discharge within the intertidal zone. Previous studies have confirmed groundwater quality to be hypersaline with TDS concentrations greater than seawater (40,000-50,000 mg/L) which is thought typical of supratidal environment that are subject to greater evaporation rates (HLA Envirosciences, 1999). Groundwater levels are noted to be particularly shallow within the supratidal areas and are noted to be expressed as surface waters during periods of high rainfall. Groundwater levels are also noted to be particularly affected by tidal variation in this area and this is very likely to affect groundwater flow direction with groundwater flow likely to be reversed during periods of high tide.

2.4.3 Groundwater Use

Tetra Tech Coffey completed a search for registered groundwater bores within a 5km radius of the site using the DWER online Water Information Reporting (WIR) database http://wir.water.wa.gov.au/SitePages/SiteExplorer.aspx) on 16 February 2022. No registered groundwater bores were identified as being within a 5 km radius of the site.

However, one groundwater license was found to exist for the adjacent Yara Pilbara Nitrates site to the east. The groundwater abstraction license, (GWL205035) owned by Yara Pilbara Nitrates Pty Ltd allows abstraction from the Pilbara Fractured Rock Aquifer for process water with an allocation of 10,000 kL/annum, which equates to an average abstraction rate of 27 m^3/day or 0.32 L/s. The license is marked to expire on 3rd

November 2030. It is assumed that any groundwater abstracted at Yara is used as process water due to the high salinity of the water. Yara's desalinisation at the technical ammonia nitrate plant capability would allow operations to improve the quality of the water for use onsite for variation purposes.

2.4.4 Beneficial Uses

Table A provides a summary of the potential beneficial uses of the aquifers to be protected according to the Water Resources Council (WRC 2004) Draft Policy and Principles, Protection of Waters from Pollution in Western Australia.

Table A: Summary of Protected Beneficial Uses and Likelihood of Use of Aquifer

Beneficial Uses	Likelihood of Groundwater Use	
	On Site	Off Site
Potable Water Supply	Unlikely – Based on current and adjacent site uses and high salinity of groundwater	Unlikely – No registered bores within 5 km of the site
Aquatic Ecosystems (Freshwater)	Unlikely – only ephemeral freshwater systems present on site, which are not seen to be in connection with groundwater.	Unlikely – only ephemeral freshwater systems in surrounding area and not thought to be in connection with groundwater, which only discharges in supratidal, marine area
Aquatic Ecosystems (Marine Water)	Likely – Groundwater discharges to supratidal area with eventual discharge to King Bay.	Likely – eventual discharge of groundwater to King Bay, which may in turn affect coastal mangrove communities
Recreation and Aesthetics	Unlikely – Based on current site use	Unlikely – based on surrounding land use
Agriculture and Aquaculture	Unlikely – Based on current site use	Unlikely – Based on surrounding land use
Industrial/Commercial Use	Unlikely – Based on current site use	Likely – Based on types of industrial activities surrounding the site and evidence of groundwater abstraction for industrial purposes at adjacent Yara Nitrates site to east

2.4.5 Groundwater Dependent Ecosystems (GDEs)

The Bureau of Meteorology (BoM) Groundwater Dependent Ecosystems (GDE) Atlas shows moderate potential nationally mapped terrestrial GDE systems in both the Site C and Site F areas both north and south of the supratidal zone respectively. These are described as rugged granitic hills supporting shrubby hard and sift spinifex grasslands. However, groundwater levels within these areas have been shown to be around 8-10 metres in depth within the bedrock and are likely well below the root zones of spinifex vegetation, which will only extend to the depth of the overlying superficial deposits. It is therefore reasonable to assume that these terrestrial systems are unlikely to be groundwater dependent.

A search of the Protected Matters Database (DoEE, 2021) indicated that there are no Ramsar or Directory of Important Australian wetlands at the Project site, or within 10 km of the site. The closest Ramsar wetland (Eighty Mile Beach wetland) is located approximately 310 km to the northeast of Karratha. The closest Directory of Important Australian wetlands (Leslie Salt Fields System) is located approximately 200 km to the northeast of Karratha.

Mangrove communities are noted to exist around 500 m west of the proposed site area at the entrance to King Bay and at the northern end of the beach located at Hearson's Cove.

2.5 SURFACE WATERS

The site is located within the Port Hedland coast basin and Karratha coast catchment. There are no permanent surface water bodies noted to be present on the site. However, three ephemeral surface water creeks are inferred to pass through the Site F area with eventual discharge to the supratidal flats and King Bay. Although no ephemeral creeks are noted to pass through the Site C area, there are a number that are positioned to the north of this area, which may produce run-off into the Site C area during high rainfall events. Two surface water pools have been noted that are positioned around 900 m to the north and 1.3 km to the northwest of the Site C area, respectively.

The closest permanent surface water bodies to the proposed site areas are features of the marine environment, namely King Bay, located around 700 m east of the site at its closest point and Hearson Cove, (Indian Ocean) located 2 km west of the site.

Rainfall is expected to directly infiltrate through the soils to recharge groundwater, evaporate at the surface or be consumed by vegetation in the root zone. Overland flow will occur during wet periods with the mudflats draining westward into King Bay. During heavy rains and extreme spring tides, the tidal mudflats between Sites C and F are subject to flooding and inundation.

In addition, it is noted that during significantly high tide (spring tide) events, supratidal waters are known to extend from the western part of the peninsula from King Bay over to the eastern coastal area and discharge into Hearson Cove.

A recent site visit conducted on 29 November 2021 observed the movement of surface water in a westerly direction across the supratidal area however, it could not be determined at the time if this was a localised phenomenon i.e. flow of water from a high point to a shallow point within the supratidal area and an influence imposed on surface water by rising and falling groundwater levels influenced by strong tides in King Bay and Hearson’s Cove.

3. FIELD ACTIVITIES

3.1 SELECTION OF MONITORING WELL LOCATIONS

An additional 10 locations were selected for drilling and installation of monitoring wells. The positions of these together with the existing 4 monitoring wells installed as part of the 2021 geotechnical investigation program are presented on Figure 4. The locations were selected using site plans together with geological and hydrogeological knowledge of the area from past investigations and consideration for both potential off-site sources of contamination and potential receptors. The well locations were based on the following criteria:

- To provide a good aerial extent for groundwater monitoring upgradient, around and downgradient of both Site C and Site F, including the causeway area linking both these areas;
- To target key areas where past site uses may have resulted in contamination of groundwater, (i.e. former laydown area within Site F);
- To provide sufficient coverage of the area immediately downgradient of the Yara Pilbara Nitrates Plant to the immediate east of the site area, where there is potential for contamination to migrate onto the Perdaman site;
- To provide sufficient coverage within the supratidal area to assess the effects of any potential contamination on shallow groundwater and surface waters; and
- To assess the interconnection between the granophyre bedrock and overlying superficial deposits as well as groundwater-surface water interaction.

3.2 MONITORING WELL INSTALLATION AND DEVELOPMENT

Groundwater monitoring wells were installed on three occasions across the site. During the geotechnical investigations undertaken by Tetra Tech in 2020, four geotechnical soil bores were converted into groundwater monitoring wells (BH12, BH22, BH27 and BH31) between 19th to 31st October 2020. Following this, a further four wells were drilled and constructed during an initial hydrogeological drilling program undertaken by Tetra Tech from 14th to 18th December 2021 (MW01, MW04, MW05 and MW06). The third round of monitoring well drilling and installation took place between 22nd to 27th January 2022.

All locations were subject to Dial Before You Dig (DBYD) searches to establish the existence of underground services. A service locator was utilised, where necessary, to locate and delineate nearby underground services.

Monitoring wells were drilled and installed using one of three techniques. Rotary air hammer was employed for wells that were targeted within the Granophyre bedrock, (MW01, MW04, MW05 and MW06) or where information was required on the nature and interconnection of both the supratidal and bedrock deposits (MW10). Monitoring wells MW02, MW03 and MW09, which intersected the supratidal deposits were drilled using hollow stem auger. Monitoring wells BH12, BH22, BH27 and BH31 were converted from geotechnical investigation holes that were drilled using diamond coring techniques. In the case of MW07 and MW08, located on the causeway area of the supratidal flats, these had to be drilled by use of a hand auger as access by the drill rig was not possible. Drilling and construction was undertaken by a licensed drilling company (Southwest Drilling) under the supervision of a suitably qualified hydrogeologist from tetra Tech.

Monitoring well construction details are summarised in Table B and logs and survey data are provided in Appendix A. All monitoring wells were installed with the general methodology presented in Appendix B.

Table B: Monitoring Well Construction Summary

Well ID	Date Installed	Casing Diameter (mm)	Total Depth (m)	Screen Interval (m)	Lithology Screened
BH12	25/08/2020	50	11.01	1.0-11.0	Granophyre
BH22	29/08/2020	50	10.265	1.0-11.6	Granophyre
BH27	19/08/2020	50	10.23	1.0-12.0	Granophyre
BH31	31/08/2020	50	11.15	1.0-12.0	Granophyre
MW01	18/12/2021	50	9.20	3.0-9.0	Granophyre
MW02	25/01/2022	50	2.67	0.4-2.8	Supratidal
MW03	26/01/2022	50	2.51	0.0-2.5	Supratidal
MW04	14/12/2021	50	~22	12.0-21.0	Granophyre
MW05	15/12/2021	50	18.36	3.0-18.0	Granophyre
MW06	16/12/2021	50	11.24	8.0-11.0	Granophyre
MW07	26/01/2022	50	1.03	0.0-1.0	Supratidal
MW08	26/01/2022	50	0.72	0.0-0.75	Supratidal
MW09	24/01/2022	50	3.45	0.4-3.4	Supratidal
MW10	27/01/2022	50	1.87	0.4-1.9	Supratidal/Calcretised Granophyre

On completion of construction, all wells were developed using an electric submersible pump until the water was free of fines and/or running clear. However, in the case of wells BH12, BH22, BH27, BH31, MW01, MW04, MW05 and MW06, the yield of these wells was too low to allow effective purging to take place. Both MW07 and MW08 were developed by use of a metal bailer until water was noted to be clear.

Despite being drilled into the Granophyre bedrock, MW10 could not be completed to its full depth due to issues with fallback and so construction was undertaken to 1.87 metres in depth as opposed to 4.5 metres. However, the well is still screened within the upper part of the granophyre bedrock and water levels are still considered to be representative for this area. Significant weathering and fracturing was noted within MW10 and an increase in groundwater flow was noted suggesting a string interconnection with overlying supratidal deposits in this area.

3.3 GROUNDWATER AND SURFACE WATER SAMPLING METHODOLOGY

A Groundwater Monitoring Event (GME) was undertaken from 8th to 10th February 2022. This consisted of a gauging round that was undertaken prior to sampling on 8th February 2022 with sampling of all wells undertaken on 9th to 10th February 2022 for a variety of key Potential Contaminants of Concern (PCoCs), as well as major ions for hydrogeochemical analysis. In addition, limited sampling of surface waters was also undertaken prior to the GME on 30th January 2022, to ascertain potential impacts from groundwater on this resource. The groundwater gauging and sampling methodology is outlined in Table C below. The surface water sampling methodology is outlined in Table D with surface water sampling locations shown on Figure 4. Due to the loss of samples in transit to the laboratory a further GME was undertaken on 20th February 2022 at 4 groundwater well locations to source replacement samples for analysis.

Table C: Groundwater Sampling Methodology

Activity	Details
Date of Activities	8th – 10th February 2022 & 20th February 2022
Gauging	Each groundwater monitoring well was for gauged using an oil / water interface probe for: • Standing Water Level (SWL) • Total well depth.
Sampling	Low-flow sampling was utilised by means of peristaltic pump with the tubing inlet positioned approximately 0.5 m below the SWL with drawdown minimised to less than 0.1 m during purging. All groundwater samples were collected upon stabilisation of relevant groundwater quality parameters being observed (i.e. three consecutive measurements) as detailed below: • +/- 10% dissolved oxygen • +/-10% temperature • +/- 10 mV oxygen reduction potential • +/- 3% electrical conductivity • +/- 0.05 pH units. Water quality measurements were collected using a supplier calibrated water quality meter. The water quality meter was also calibrated daily prior to being used. Samples were collected upstream of the water quality meter flow-through cell, and placed into laboratory prepared containers, preserved for the relevant analyses. Containers were stored in a cooled insulated carrier for transport to the selected National Association of Testing Authorities (NATA) accredited laboratory for analysis under chain of custody (COC) control. Where the use of a peristaltic pump proved prohibited, plastic bailers were used to collect samples by purging each well by at least 5 well volumes prior to sampling. Where this could not be achieved due to the well being of low yield, the well was simply bailed dry with as much sample collected as practically possible.
Waste disposal	All purged water from groundwater monitoring wells was retained onsite.
Decontamination	The interface probe was cleaned and rinsed with Liquinox (PFAS free) between each site prior to use. New plastic tubing was used at each location to prevent cross-contamination of samples.

Table D: Surface Water Sampling Methodology

Activity	Details
Date of Activities	30th January 2022
Sampling	Representative samples were collected from surface waters contained within the supratidal zone or boundary of Site C, where water was present. Where possible, each surface sample was collected by inserting the laboratory prepared containers with the opening pointing down and opened underwater to avoid the collection of surface films. Otherwise, samples were collected in laboratory prepared containers using a long-reach sample pole, preserved for the relevant analyses, by lowering the container mouth first to minimise the potential collection of surface films, lowered to approximately 0.15 m below surface level, turned sideways and allowed to fill. Containers were stored in a cooled insulated carrier for transport to the selected NATA accredited laboratory for analysis under COC control.

4. ASSESSMENT CRITERIA

In terms of assessing the relevance of groundwater and surface water quality results in relation to protecting environmental values, the adopted assessment criteria are based on the requirements of the following guidelines and standards:

- HEPA (2020) PFAS National Environmental Management Plan (NEMP), Version 2.0 Final 2020.
- NEPC (2013) National Environment Protection (Assessment of Site Contamination) Measure (1999) as amended 2013. National Environment Protection Council
- DWER (2021) Assessment and management of contaminated sites.

4.1.1 Groundwater and Surface Water Assessment Criteria

Adopted groundwater and surface water criteria consider the following information obtained:

- Groundwater within the superficial aquifer beneath the site discharges to the Indian Ocean.
- Groundwater and surface water from the site discharges to supratidal areas with eventual discharge to King Bay.
- Therefore, groundwater results for COPC's will be screened against the 95% species protection criteria for slightly to moderately disturbed systems. However, for PFAS a high conservation value systems criterion will be adopted as the Water Quality Guidelines (WQG's) advise that the 99% level of protection be used for slightly to moderately disturbed systems.
- Based on the TDS of the groundwater and surface water, the highest beneficial use at the Site is Aquatic Ecosystems (Marine Water), refer Table I.
- It is also plausible that groundwater is abstracted for process use at surrounding industrial sites.
- On this basis, the adopted Investigation Levels (IL) for groundwater and surface water are:
- <u>NEPM (2013) and DWER (2021)</u>
    - Australia and New Zealand Water Quality Guidelines (ANZG, 2018) - Marine Water 95% Species Protection
    - ANZECC and ARMCANZ (2000) (Table 3.3.8) – Pilbara and Kimberley regions slightly disturbed ecosystems
    - DoH (2014) Domestic Non-Potable Use (NPUG) (including WHO 2008 for TRH)
    - Health Screening Levels (HSLs) Vapour Intrusion – Commercial/Industrial
    - Health Investigation Levels (HILs) - Commercial/Industrial
- <u>HEPA (2020)</u>
    - Human Health - Recreational water quality
    - Ecological Water Quality – Freshwater 99% species protection
- <u>United States Environmental Protection Authority (US EPA, November 2021)</u>
    - Regional Screening Levels (RSLs)

5. QUALITY ASSURANCE AND QUALITY CONTROL

Quality assurance and quality control (QAQC) procedures were adopted during the fieldworks in accordance with relevant DWER guidelines and Coffey's internal QAQC field protocols. The QAQC system allows the collected data to be assessed to provide evidence that the data is fit for interpretative use. An assessment of the validity of laboratory results has been made through consideration of field and laboratory procedures and by comparing QAQC results against predetermined qualitative criteria.

5.1 FIELD QA/QC PROCEDURES

A summary of the field QA/QC procedures employed during the field activities is presented in Table E.

Table E: Field method validation

Requirement	Yes/No	Comments
All samples were submitted to NATA accredited laboratories	Yes	-
Appropriate sample collection	Yes	-
Appropriate sample preservation	Yes	All samples were preserved as best as possible by placing samples in insulated eskies with ice. Ice was renewed on a regular basis. Where freight was not possible on the same day as sampling samples were retained in eskies in air-conditioned rooms until the following day when samples were handed over to the freight company for shipping to the testing laboratory
Water sample holding times within acceptable range (collection to extraction)	No	Breaches of holding time were observed for pH (lab), ammonia, nitrite, NOx, TKN and TP. Breaches are associated with prolonged or delayed freight and shipping from a regional area i.e. Karratha to Perth

5.2 LABORATORY QA/QC

Primary and duplicate water samples (including field QC samples) were submitted to ALS, with triplicate samples sent to MGT Eurofins. Both labs are NATA accredited for the laboratory analysis performed. Certified laboratory reports and laboratory QA/QC data are included in Appendix D. An assessment of analytical quality control results is summarised in Table F.

Table F: Analytical quality control validation

Requirement	Yes/No	Comments
Percentage recovery results were all within the acceptable range (70-130%) for all matrix spikes (MS), MS duplicates, laboratory control samples and surrogates for all analytes.	Yes, with exceptions	**Eurofins work order no:. 863798.** Spike % Recovery Fail for Total Alkalinity. CP was <70% (QC Lot: L22-Fe30964) Spike % Recovery Fail for PAH (9 of 16 compounds). CP was <70% (QC Lot: L22-Fe30964). Qualifying code no. QC8 **ALS work order no:. EP2201086-027.** Matrix Spike Recovery Fail for Ethanolamines (QC19). MS <70% **ALS work order no:. EP2201003-096.** Matrix Spike Recovery Fail for MeFOSE (QC Lot No. 4149135). MS <70%

Requirement	Yes/No	Comments
		ALS work order no:. EP2201010-001. Matrix Spike Recovery Fail for PFPeS (QC Lot No. 4147922). MS >130% and <70% **ALS work order no:. EP2200693-001.** Matrix Spike Recovery Fail for Arsenic, (QC Lot No. 4142564)). MS <70%
Laboratory internal standards, calibration blanks and mid-range calibration verifications were acceptable.	Yes	-
Laboratory internal duplicates conducted at a rate of 1 in 20 and inside an acceptable range of 0 – 50%.	Yes, with exceptions	**ALS work order no:. EP2201159-001.** TPH >50% for C_{15}-C_{28}, C_{29}-C_{36} fractions in (QC lot: 4154501) TRH >50% for >C_{16}-C_{34} and >C_{34}-C_{40} in (QC lot: 4154501) **Eurofins work order no:. 860924.** TKN in water (QC15) >50% (QC lot: M22-Fe10053) **Eurofins work order no:. 863798.** Napthalene in water. 46% exceeding the >30% PASS (QC lot: L22-Fe26971)
All laboratory quality control frequency parameters were compliant.	Yes, with exceptions	**ALS EP2201691.** Laboratory Duplicates for PAH/Phenols, Pesticides, and TRH not within specification. MS QC samples not within specification for Ethanolamines, PAH/Phenols, Pesticides, and PCB's **ALS EP2201196.** Laboratory Duplicates for PAH/Phenols, PFAS, Pesticides, PCB's, TRH not within specification. MS QC samples not within specification for Ethanolamines, PFAS, PAH/Phenols, Pesticides, PCB's and TRH **ALS 2201086.** Laboratory Duplicates for PAH/Phenols, Pesticides, PCB's, and TRH not within specification. MS QC samples not within specification for Ethanolamines, PAH/Phenols, Pesticides, PCB's, and TRH **ALS 2201074.** Water: Lab Duplicates for QC samples not within specification for Pesticides, PCB's, PAH/Phenols, and TRH. Water: MS for PAH/Phenols, Pesticides, PCB's, and TRH not within specification. **ALS 2201008.** Water: Lab Duplicates for QC samples not within specification for PAH/Phenols, PFAS, Pesticides, PCB's, TRH. Water: MS for PAH/Phenols, PFAS, Pesticides, PCB's, and TRH **ALS 2201003.** Water: MS for TRH, QC frequency not within specification Water: Lab CS (LCS) not within specification for TRH **ALS 2200878.** Water: DUP samples for PAH/Phenols, PFAS, Pesticides, PCB's, TRH not within specification.

Requirement	Yes/No	Comments
		Water: MS samples not within specification for ethanolamines, PAH/ Phenols, PFAS, Pesticides, PCB's, TRH not within specification **ALS 2202113**. Water. MS Recoveries for sulfate and chloride for sample (MW3) were not determined. Background level greater than or equal to 4x spike level **ALS 2202113.** Lab DUP and MS outliers exist for frequency of QC samples. Rate of 0% achieved for both lab DUP and MS instead of 5% and 10% respectively.
Were laboratory LORs at their standardised level?	Yes	-

5.3 FIELD QA/QC DATA ASSESSMENT

The quality control samples collected during the site assessment are detailed in G, and results are discussed in the proceeding sections.

Table G: Quality Control Samples

QC Identification	Type of Sample
Surface water	
QC39	Rinsate
QC38	Field Blank
QC36	Duplicate
QC37	Triplicate
TBW45	Transport Blank
Groundwater (8th – 10th February 2022)	
QC1, QC6	Duplicate
QC2, QC7	Triplicate
QC4, QC5, QC9	Rinsate
QC3, QC8	Field Blank
TBW46	Transport Blank
Groundwater (20th February 2022)	
QC1	Duplicate
QC2	Triplicate
QC3	Field Blank
QC4	Rinsate
TBW166	Transport Blank

5.4 QA/QC SUMMARY

With consideration for the above quality assurance and quality control measures, the overall robustness, defensibility, and reliability of the data was assessed. In summary:

- Minor laboratory non-conformances such as matrix spike failures or laboratory internal duplicates and matrix spike frequency outliers are unlikely to affect the results as the site is known to have elevated nutrients and metals.
- Raised LORs were considered during data assessment

  It is noted that samples with elevated LORs were typically saline which can affect analysis of metals. In future, the laboratory will be advised of high TDS samples so that these wells can be analysed using an analytical method appropriate for marine water samples.
- Nitrite and NOx analysis exceeded the holding time by three days for SW4, SW5 and QC36
- TKN extraction/ preparation exceeded the holding by eight days for SW4, SW5 and QC36
- TP extraction/ preparation exceeded the holding by seven days for SW4, SW5 and QC36

In consideration to the above, the field method validation and laboratory QA/QC measures employed throughout the assessment indicate that the quality of field sample collection and laboratory analysis procedures were generally satisfactory. The data from both the primary and secondary laboratory is considered of acceptable quality to be used as a basis for assessing current groundwater conditions at the site.

6. RESULTS

6.1 GEOLOGY

The logged geology encountered during drilling of the monitoring wells and other investigations undertaken in the area is detailed in Table H below.

Table H: Summary of Site-Specific Geology

Measured Depth (m)	Lithology	Logged Description
0-1.5	Sandy Gravel	Red-brown in colour, poorly sorted, subangular to subrounded fragments of granophyre and calcrete within a sandy matrix. Shell fragments present in places.
0-1.5	Sandy Clay	Orange-brown. Medium grained and moderately sorted with a silty clay matrix.
0-2.0	Clay	Brown, high plasticity with fragments of calcrete.
0.5-3.0	Calcrete	Pink-white, mottled, calcareous.
0.25-12.0	Granophyre	Fine crystalline texture. Weathered and fractured in places. Calcretised in places.

6.2 HYDROGEOLOGY

Details on general site-specific hydrogeology are noted in Table I below.

Table I: Site Specific Hydrogeology

Item	Description
Depth to Groundwater	Static water levels (SWLs) ranged from 0.41 mBTOC (MW09) to 21.61 mBTOC (MW04).
Light Non-Aqueous Phase Liquid (LNAPL)	LNAPL not detected. Superficial groundwater beneath the Site is present within an unconfined aquifer consisting of sandy clays, sandy gravels, clays or calcrete.
Hydraulic Gradient	Based on the groundwater contour plan (Figure 5) developed from the data collected, on-site groundwater flow direction is inferred to be either to the southwest in Site C or to the northwest in Site F with a calculated hydraulic gradient of 0.00126 (calculated between monitoring wells BH22 and MW03).
Groundwater Velocity	Superficial groundwater beneath the Site is present within an unconfined clay, sandy clay or sandy gravel aquifer. Based on typical lithology/hydraulic conductivity estimates (Kruseman and de Riffer, 1991) the estimated groundwater velocity within the superficial aquifer beneath the Site is likely to be approximately 0.01 to 5 m/day (clay to sandy gravel). Groundwater velocity within the Gidley Granophyre will vary greatly dependent on the extent of fracturing, which will provide preferential flowpaths and more rapid groundwater flow. Flow velocity may vary from almost 0 to 10^3 m/day.

Item	Description
Effective Porosity	Soils in the unconfined aquifer are largely comprised of clay or sandy clay/sandy gravel. Effective porosity is therefore between 0.25 (sand or gravel) and 0.4 (clay) (Kruseman and de Ridder, 1991).

6.3 GROUNDWATER LEVELS

The results of groundwater gauging along with survey information are presented in Table J with groundwater contours presented on Figure 5. Groundwater gauging sheets are presented in Appendix C.

Based on the gauging information presented, groundwater flow is toward the southwest in the Site C area and the northwest in the Site F area with eventual discharge shown to be into the Supratidal area with eventual discharge to King Bay to the west. The hydraulic gradient is shown to be reasonably gradual with water levels very close to surface within the supratidal areas and with surface waters in this area likely to be a surface expression of groundwater during high rainfall events.

Due to the heavy tidal influence in the area it is likely that groundwater flow directions will change and may reverse during periods of high tide. An area of mounding was noted at MW09, which is likely caused by pooling of tidal waters in this area and inundation of this well. Variations in water levels were noted in places which are likely to be a reflection of tidal influence throughout the period of gauging as this was undertaken over a 2-3 hour time period.

Table J: Groundwater Level & Monitoring Well Survey Information

Well ID	Date Gauged	Easting (MGA 94 Zone 51)	Northing (MGA 94 Zone 51)	Ground RL (mAHD)	Casing RL (mAHD)	Depth to Water (mbtoc)	Groundwater Elevation (mAHD)
BH12	08/02/2022	476762.865	7718885.787	2.456	3.229	1.145	2.084
BH22	08/02/2022	476812.383	7719316.829	12.996	13.701	10.955	2.746
BH27	08/02/2022	476360.159	7718797.480	2.092	2.686	0.86	1.826
BH31	08/02/2022	476494.894	7718176.630	9.283	9.921	8.37	1.551
MW01	08/02/2022	476228.470	7719009.571	7.079	7.923	7.89	0.033
MW02	08/02/2022	476519.248	7718812.931	2.151	2.766	0.815	1.951
MW03	08/02/2022	476831.778	7718835.973	2.225	2.690	0.55	2.14
MW04	08/02/2022	476605.629	7717994.051	15.830	16.588	21.61	5.022
MW05	08/02/2022	476759.793	7718336.059	8.292	9.209	7.625	1.584
MW06	08/02/2022	476090.716	7718035.353	6.918	7.851	6.505	1.346
MW07	08/02/2022	476709.268	7718666.274	1.929	2.813	0.915	1.898
MW08	08/02/2022	476712.205	7718582.203	1.979	2.904	1.13	1.774
MW09	08/02/2022	476232.717	7718764.131	1.987	2.442	0.41	2.032
MW10	08/02/2022	476812.205	7718959.099	2.725	3.224	1.01	2.214

6.4 WATER QUALITY

6.4.1 Groundwater Physiochemical Parameters

Groundwater quality parameters measured post-purge during field GME activities conducted between 8th to 11th February 2022 are shown in Table K with groundwater sampling forms presented in Appendix C. It should be noted that Dissolved Oxygen measurements are likely to be unrepresentative of site conditions as it was noted that the inlet to the flow through cell was leaking during sampling. Therefore, more reliance was placed on other parameters such as redox potential to ensure stabilisation of chemistry. The following observations are noted:

- Reduction (redox) potential (Eh) measurements were seen to range from -68.6 mV to -169.2 mV within wells that were primarily screened within the granophyre bedrock showing predominantly reducing conditions. Within wells that were predominantly screened within the supratidal deposits, redox varied between 67.5 mV to 167.6 mV indicating significantly aerobic conditions, which will be a result of heavy aeration from significant interaction with the atmosphere and oxidised surface waters.
- Electrical conductivity ranged from 5,206 µS/cm to 189,810 µS/cm indicative of brackish to hypersaline conditions. Brackish conditions are noted to exist within wells screened predominantly within the granophyre bedrock away from the supratidal areas whereas hypersaline conditions are noted within wells adjacent to or within the supratidal areas demonstrating a significant tidal influence.
- Field pH measurements ranged from pH 6.56 to pH 7.76 indicating circum-neutral groundwater conditions.
- Temperature measurements ranged from 28.7°C to 32.2°C with an average temperature of 25.7°C

Chemical indicators that may indicate that groundwater is being affected by, or has already been affected by, the oxidation of sulfides include:

- a chloride:sulfate ratio less than 2
- a pH of less than 5; and/or
- soluble aluminium concentration greater than 1 mg/L.

The chloride:sulfate ratio was calculated for up to six samples and the calculations ranged from 7.6 to 275 suggesting little to no affect on water from the oxidation of sulfides. Up to six samples were tested for soluble aluminium and the reported concentrations were all <1 mg/L supporting the above assumption.

Total acidity (as $CaCO_3$) was tested on up to six samples and concentrations ranged from 32 mg/L in BH22 to 53 mg/L in samples BH12 and MW01 however, in corresponding samples total alkalinity ranged from 105 mg/L in BH12 to 563 mg/L in sample BH22 providing significant buffering capacity for groundwater.

.

Table K: Groundwater Physiochemical Parameters

Well ID	Dissolved Oxygen (mg/L)	Electrical Conductivity (µS/cm)	pH (pH units)	Redox Potential (mV)	Temperature (°C)	Comments
BH22	0.3	7,469	7.21	-116.4	29.6	Black with organic odour
BH12	2.7	164,862	6.87	-111.8	29.9	Clear, No odour
BH27	94.2	189,810	6.77	67.5	29.3	Clear
BH31	89.2	7,111	7.74	-98.3	29.3	Cloudy, Slight organic odour
MW01	5.0	9,070	6.56	-169.2	28.7	Clear
MW02	77.1	176,602	7.05	115.7	32.2	Clear. No odour
MW03	13.2	119,910	7.51	94.1	30.2	Clear
MW04	Insufficient Sample – No data					
MW05	36.8	5,206	6.79	-112.4	29.4	Clear
MW06	84.0	5,184	6.98	-68.6	29.0	Clear. Slightly organic odour
MW07	94.4	185,223	7.08	167.6	31.0	Clear
MW08	97.4	145,038	7.15	93.4	29.3	Clear
MW09	20.3	141,662	6.84	77.2	29.5	Very cloudy, pale brown
MW10	17.1	8,607	7.76	67.8	31.4	Clear

6.4.2 Hydrogeochemistry

Major ion analysis was undertaken on a selected number of wells across the monitoring network. The results were used to plot both a trilinear plot (Figure B) and a Durov plot (Figure C) using ESDAT®. The groundwater within both the superficial deposits and the granophyre bedrock are of a Sodium-Potassium-Chloride type (Na-K-Cl) showing evidence that both are likely interconnected. All groundwater is shown to be circum-neutral with pH values at around pH7. All groundwater is noted to be brackish to saline in nature with groundwater within the granophyre bedrock generally more brackish and groundwater within the superficial deposits being more saline in nature due to regular tidal inundation. Where groundwater from the bedrock aquifer comes into contact with the superficial aquifer a degree of mixing is expected, i.e. MW10 which has slightly higher brackish water compared to other wells within the granophyre bedrock aquifer.

Figure B: Trilinear Plot

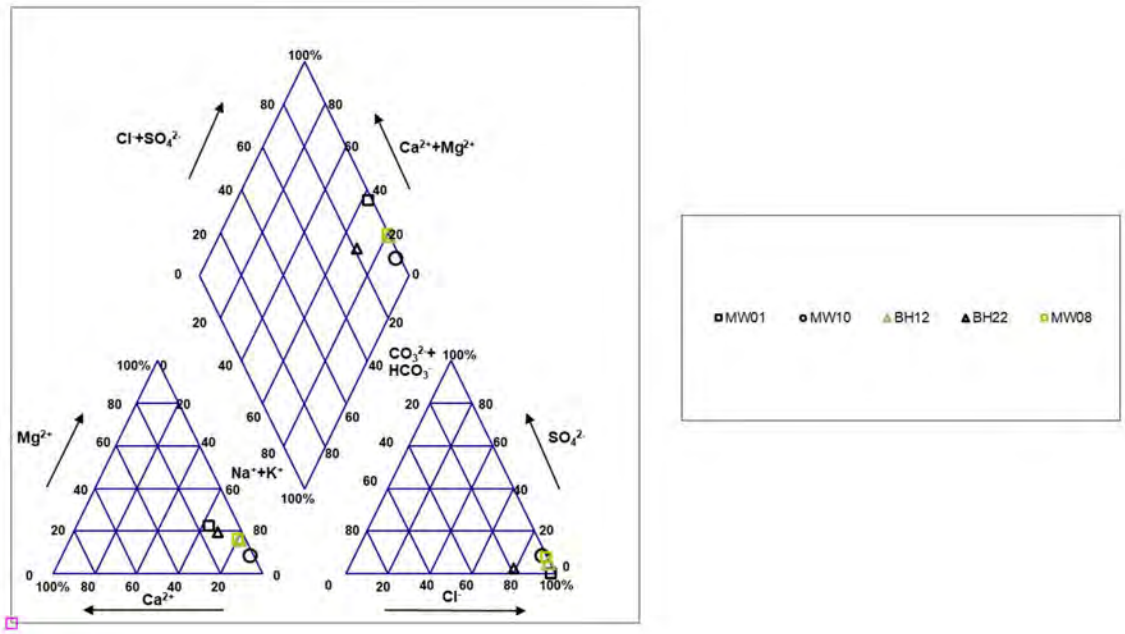
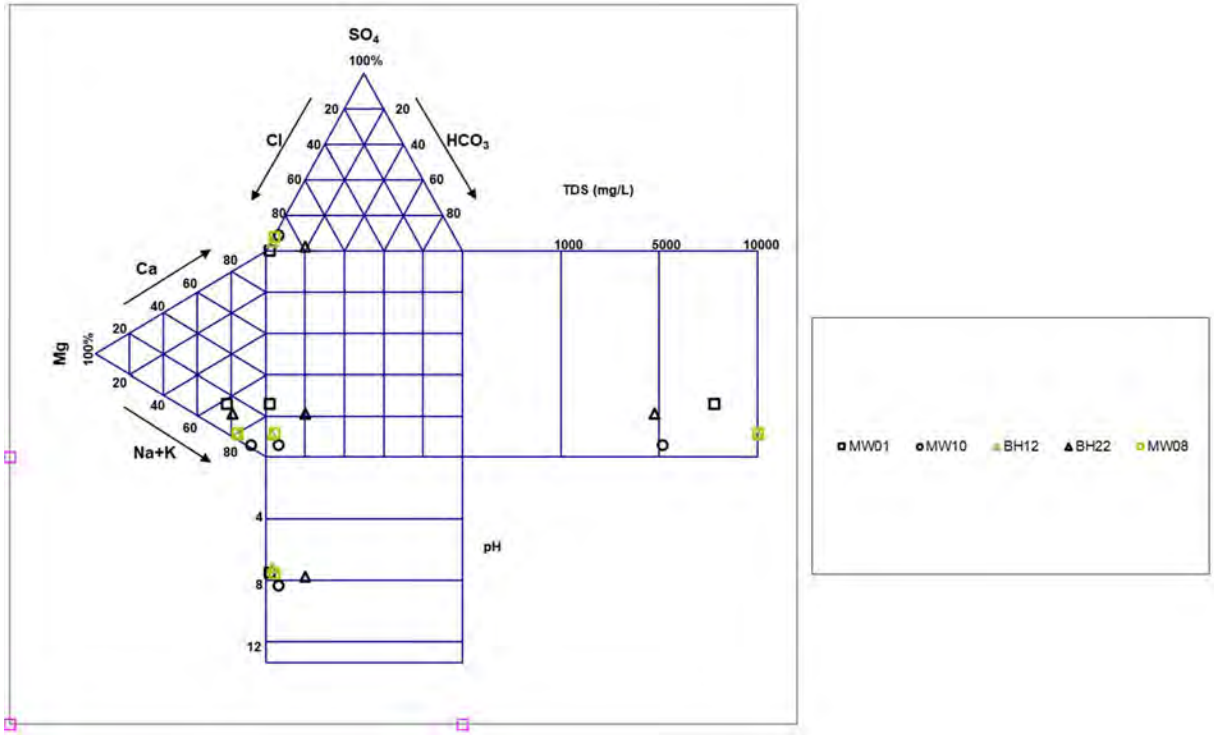


Figure C: Durov Plot



6.4.3 Groundwater Quality Assessment

Laboratory certificates are presented in Appendix D with a complete set of groundwater quality results presented in Appendix E. It should be noted that some groundwater results are pending and these will be included in subsequent revisions of this report. It should also be noted that samples MW07-2 and MW08-2 are replacement samples for MW07 and MW08 and were taken by use of low flow methods as opposed to bailing.

6.4.3.1 Nutrients

Regarding concentrations of major nutrients in groundwater the following results were reported.

- Ammonia was detected in six samples (BH12, BH22, BH31, MW06, MW08, and MW08-2) at concentrations ranging from 0.13 mg/L to 9.19 mg/L
- Nitrate was detected in five samples (BH22, MW06, MW08, MW08-2, MW10) at concentrations ranging from 0.02 mg/L to 9.16 mg/L
- Nitrite was detected in four samples (MW06, MW08, MW08-2, MW10) at concentrations ranging from 0.01 mg/L to 0.64 mg/L
- Total Nitrogen (TN) was detected in eight samples (BH12, BH22, BH31, MW05, MW06, MW08, MW08-2, and MW10) at concentrations ranging from 0.5 mg/L to 63 mg/L
- Total Kjeldahl Nitrogen (TKN) was detected in eight samples (BH12, BH22, BH31, MW05, MW06, MW08, MW08-2, and MW10) at concentrations ranging from 0.5 mg/L to 63 mg/L
- Total Phosphorus was detected in eight samples (BH12, BH22, BH31, MW05, MW06, MW08, MW08-2, and MW10) at concentrations ranging from 0.02 mg/L to 0.86 mg/L.

6.4.3.2 Metals and Metalloids

Concentrations of soluble chromium (III+VI), copper, lead, mercury were reported below laboratory LOR's. Regarding other toxicants or metalloids, the following detections were reported.

- Aluminium was detected in two samples (BH22 and MW10) at concentrations ranging from 0.02 mg/L and 0.05 mg/L
- Arsenic was detected in five samples (BH22, BH31, MW1, MW5, MW6) at concentrations ranging from 0.001 mg/L to 0.005 mg/L
- Cadmium was detected in one sample (MW6) at concentration of 0.0002 mg/L
- Soluble iron was detected in three samples (BH12, BH22 and MW1) at concentrations ranging from 5.39 mg/L to 15.8 mg/L
- Manganese was detected in eight samples (BH12, BH22, BH27, MW1, MW2, MW8, MW8-2 and MW9) at concentrations ranging from 0.033 mg/L to 17.5 mg/L
- Nickel was detected in five samples (BH22, BH31, MW1, MW5 and MW6) at concentrations ranging from 0.003 mg/L to 0.028 mg/L
- Zinc was detected in seven samples (BH12, BH22, BH31, MW6, MW7-2, MW8, MW8-2) at concentrations ranging from <0.1 mg/L to 0.035 mg/L

6.4.3.3 Per-and-Polyfluoroalkyl Substances (PFAS)

Up to 14 groundwater samples were taken from BH12, BH22, BH27, BH31, MW1, MW2, MW3, MW5, MW6, MW7-2, MW8, MW8-2, MW9 and MW10, and each sample was tested for PFAS long suite (28 analytes). Various PFAS compounds were detected in all samples at low levels with sum of PFAS ranging from 0.0218 ug/L in sample MW01 to 5.64 ug/L in BH22. Regarding PFOS and PFOA the following detections are noted.

- Concentration of PFOS in all samples ranged from <0.0002 ug/L in MW7-2 to 0.726 ug/L in BH22. Exceedances of the adopted assessment criteria occurred in samples except for MW2, MW3, MW7-2 and MW9
- Concentration of PFOA in all samples ranged from 0.0013 ug/L in MW7-2 to 0.232 ug/L in BH22.

6.4.3.4 Ethanolamine, Diethanolamine, Methyl-diethanolamine

Up to ten groundwater samples were taken from BH12, BH22, BH27, MW2, MW3, MW7-2, MW8, MW8-2, MW9 and MW10, and each sample was tested for ethanolamines including (diethanolamine, ethanolamine, and methyldieethanolamine). All concentrations were reported as either non-detect or below the laboratory LOR.

6.4.3.5 Organochlorine/Organophosphorous Pesticides (OC & OP)

Up to five groundwater samples were taken from BH31, MW3, MW4, MW5 and MW6, and each sample was tested for OC/OP pesticide suites. All concentrations were either reported as non-detect or below the laboratory LOR.

6.4.3.6 Polychlorinated Biphenyl (PCB)

Up to five groundwater samples were taken from BH31, MW3, MW4, MW5 and MW6, and each sample was tested for sum of PCB. All concentrations were either reported as non-detect or below the laboratory LOR.

6.4.3.7 Polycyclic Aromatic Hydrocarbons (PAH)

Up to nine groundwater samples were taken from BH12, BH22, BH31, MW3, MW05, MW06, MW08, MW08-2 and MW010, and each sample was tested for PAH suite. All concentrations were either reported as non-detect or below the laboratory LOR.

6.4.3.8 Benzene, Toluene, Ethylbenzene, Xylene and Napthalene (BTEXN)

Up to nine groundwater samples were taken from BH12, BH22, BH31, MW3, MW05, MW06, MW08, MW08-2 and MW010 and each sample was tested for BTEXN analytes. All concentrations of BTEXN were reported below the laboratory LOR.

6.4.3.9 Total Recoverable Hydrocarbons

Up to nine groundwater samples were taken from BH12, BH22, BH31, MW3, MW05, MW06, MW08, MW08-2 and MW010 and each sample was tested for TRH/ TPH. TRH/ TPH was reported below LORs in all samples tested with the following exceptions. Refer to Figure 14 for sample locations.

- Sample BH22. C_{15}-C_{28} was reported at a concentration of 0.24 mg/l.
- Sample BH31. C_{10}-C_{14} was reported at a concentration of 9.22 mg/l.
- Sample BH31. C15-C28 was reported at a concentration of 2.94 mg/l.
- Sample BH31. F2 (C_{10}-C_{16}) was reported at a concentration of 11.6 mg/l exceeding adopted assessment criteria.

6.4.4 Surface Water Quality Assessment

Laboratory certificates are presented in Appendix D with a complete set of surface water quality results presented in Appendix E.

6.4.4.1 Nutrients

Concentrations of CoPC's in surface water samples were reported as non-detect or below laboratory limits of reporting in all samples with the following exceptions.

- Total Nitrogen was reported at concentrations of 2.8 mg/L and 1 mg/L respectively, with both reports exceeding the adopted assessment criteria of 0.25 mg/L
- Total Phosphorus was reported at concentrations of 0.22 mg/L and 0.07 mg/L respectively, with both reports exceeding the adopted assessment criteria of 0.02 mg/L.

6.4.4.2 PFAS

Concentrations of PFAS compounds in surface water samples were reported as non-detect or below laboratory limits of reporting with the following exceptions.

- SW4. PFBS was reported at a concentration of 0.002 ug/L
- SW4 and SW5. PFBA was reported at concentrations of 0.123 ug/L and 0.0165 ug/L respectively
- SW4 and SW5. PFPeA was reported at concentrations of 0.698 ug/L and 0.0765 ug/L respectively
- SW4 and SW5. PFHxA was reported at concentrations of 0.0586 ug/L and 0.0611 ug/L respectively
- SW4 and SW5. PFHpA was reported at concentrations of 0.018 ug/L and 0.0178 ug/L respectively
- SW4 and SW5. PFOA was reported at concentrations of 0.0017 ug/L and 0.0029 ug/L respectively

7. CONCEPTUAL SITE MODEL

Based on the information acquired during these investigations, a baseline hydrogeological Conceptual Site Model (CSM) has been derived for the site to aid in future groundwater monitoring, modelling and environmental risk assessment work, where necessary. A diagrammatic representation of the CSM is shown in Figure 6 with the key information summarised in Table L.

Table L: Hydrogeological Conceptual Site Model

Hydrostratigraphic Unit	Depth (m)	Average Saturated Thickness (m)	Description of Unit	Estimated Flow Velocity (m/day)	Comments
Superficial Deposits	Estimated up to at least 5 metres	At least 3-4 metres with inundation during high tide	Shallow sediments	0.01-5	Unconfined in nature, tidally influenced with flow direction toward King Bay to West. Groundwater expressed as surface water during high tides.
Granophyre	0.25-20+ (maximum drilled depth)	Unknown	Low permeability bedrock with occasional fracturing	$0\text{-}10^3$	Igneous formation, weathered and fractured in places. Unconfined in nature and tidally influenced. Groundwater interconnected with overlying superficial deposits. Groundwater flow discharging to Supertidal flats and eventually to King Bay.

8. POTENTIAL IMPACTS TO GROUNDWATER AND SURFACE WATER

8.1 DEWATERING

It is understood that there are to be no dewatering operations undertaken during construction of the site and as a result it is unlikely that site activities will affect any surrounding users of groundwater or potential receptors in terms of abstraction.

8.2 CONTAMINATION

Further detailed analysis of groundwater and surface water contamination is presented within the Baseline Contamination Assessment – Detailed Site Investigation undertaken by Tetra Tech Coffey (Tetra Tech Coffey 2022c).

Elevated levels of nutrients were found in both groundwater and surface water at locations that were mainly in proximity to the Yara Pilbara Nitrate (YPN) Plant in the eastern section of Site C, within the causeway area between Site C and Site F and in the central and western area of Site F where it is understood that a former laydown area existed. In surface waters, only Total Phosphorus (TP) and Total Nitrogen (TN) exceeded adopted criteria at 0.02 mg/L and 0.25 mg/L respectively. The source of nitrogen is thought to be organic in nature with phosphorous naturally occurring from soils in the supratidal area. In groundwater, there were exceedances relative to adopted criteria for Ammonia, TN and TP. The source of TN is thought to be from both organic and inorganic sources (faecal matter and nitrogen-based fertilisers) with TP likely to be mineral based and leached from soil and rocks.

PFAS was detected in surface waters in the supratidal zone in the eastern section of Site C downgradient of the Yara fertiliser plant, which is thought to be the source of these detections however, there were no exceedances relative to adopted criteria. Within groundwater, PFOS was detected in all samples except MW02, MW03 and MW07-2 and exceeded the interim 99% marine species criteria within two samples (BH22 and BH31) exceeding interim 95% marine species criteria. Again, the source of PFAS and PFOS is thought to be the YPN plant located upgradient of the site to the east.

Hydrocarbons were detected in groundwater at BH22 (Site C) and BH31 (Site F). When sampling BH22 it was noted that the sample was black in colour with a significant organic odour. Total Recoverable Hydrocarbons (TRH) was recorded at 0.22 mg/L however this was below adopted assessment criteria. The exact source of this contamination is unknown, but it is likely to emanate from the adjacent YPN plant located immediately to the east. BH31 showed a significant concentration of fuel oil or diesel oil hydrocarbons (11.6 mg/L) exceeding the relevant assessment criteria by a factor of 13. Again, the source is unknown however, as this site is located adjacent to Hearson Cove Road the contamination may represent a localised vehicle oil spill.

Heavy metals were detected in most groundwater samples across the site but were mainly below assessment criteria. The exceptions were Copper, Iron, Manganese and Zinc, which exceeded both ANZECC 2000 and DoH NPUG (2014) criteria in BH12, BH22, BH31, MW01 and MW06. The source of this contamination is unknown but is likely to be consistent with regional groundwater quality.

Sources of nutrients and PFAS in groundwater and surface water are thought to emanate from the YPN plant located upgradient to the east of the site with hydrocarbon contamination noted to be very localised in nature within the granophyre bedrock only. This would suggest that the actual Perdaman site itself does not pose a significant risk to environmental values of the surrounding area including groundwater and surface water. In particular it should be noted that where TRH was identified in groundwater (BH22 and BH31) the wells were noted to be particularly low yielding. As a result of this and the likely localised nature of the contamination, this is unlikely to pose a risk to both surrounding groundwater and the wider environment. The low permeability of

the granophyre bedrock with the absence of obvious fracturing in this area will result in significant retardation of this localised contamination, which is likely to mean that contamination will have likely degraded prior to impacting any significant receptor (i.e. superficial deposits or surface waters).

Furthermore, it should be noted that the low yielding nature of the granophyre bedrock limits its viability for use with only small amounts of water available in areas where factures and weathering are prevalent. The salinity of groundwater within the superficial aquifer also limits its environmental value and suitability for a variety of uses other than industrial and marine ecosystems. Therefore, the limited contamination identified within groundwater on site is considered to pose a low risk to the surrounding area and environmental values.

9. MONITORING PROGRAM

In order to minimise project attributable impacts on groundwater quality, flow direction and/or depth to maintain the hydrological regimes and quality of groundwater and surface water to protect environmental values, a Groundwater Monitoring Event (GME) should be undertaken every 6 months. The results of the GME should be compared to both baseline data and relevant trigger values to identify impacts to groundwater during construction and site operations. If relevant trigger criteria are breached, management measures should be implemented to control and prevent further impacts from occurring. Table M outlines the details of the proposed monitoring program for the Perdaman site. The parameters selected are based on the likely Potential Contaminants of Concern (PCoCs) present during construction of the site and during site operations.

Table M: Proposed Groundwater Monitoring Schedule

Sample Locations	Frequency	Parameters	Trigger Values	Threshold Values
BH12, BH22, BH27, BH31, MW01, MW02, MW03, MW04, MW05, MW06, MW07, MW08, MW09, MW10	6 monthly (biannually)	Depth to Groundwater (mBTOC) Depth to Groundwater (mAHD)	Continuous increasing trend Continuous decreasing trend	Continuous increasing/decreasing trend of >12 months
		Physical Parameters (including major ions, pH, EC and ORP)	Major ions = Significant change (i.e. +/-25%) from baseline chemistry. pH = 1 pH unit decrease. EC = 20% change under same tidal conditions. ORP = Change from oxidising to reducing or vice versa.	Major ions = +/-30% from baseline chemistry pH = <4.5 EC = 30% change under same tidal conditions ORP = Change from oxidising to reducing or vice versa.
		Total Recoverable Hydrocarbons (TRH)	Baseline value (where detected) +10%. Where Baseline value is <LOR, trigger is equal to LOR.	Maximum concentration + Standard Deviation
		Benzene, Toluene, Ethylbenzene and Xylene (BTEX)	Where Baseline value is <LOR, trigger is equal to LOR.	Exceedance relative to designated environmental criteria (Marine Water LOSP 95%)
		Nutrients (Ammonia, Total Nitrogen, Nitrite, Nitrate and Total Kjeldahl Nitrogen)	Baseline value (where detected) +10%. Where Baseline value is <LOR, trigger is equal to LOR.	Maximum concentration + Standard Deviation

Sample Locations	Frequency	Parameters	Trigger Values	Threshold Values
		Metals (Total Iron, Total Aluminium, Arsenic, Cadmium, Cobalt, Copper, Lead, Chromium, Nickel, Selenium and Zinc)	Baseline value (where detected) +10%. Where Baseline value is <LOR, trigger is equal to LOR.	Maximum concentration + Standard Deviation

10. MANAGEMENT MEASURES

In the event that the monitoring program indicates exceedance of trigger levels:

- The proponent shall report such findings to the CEO within seven days of the exceedance being identified;
- Where an exceedance of the trigger value is identified, increase monitoring frequency from 6 monthly to quarterly to assess trends or whether increase/exceedance is persistent;
- Investigations will take place to identify the cause(s) of the identified exceedance(s). Such investigations may include confirmation of the integrity of site storage facilities, identification of plant failures and/or spills and assessment of general housekeeping;
- If the exceedances are determined by the CEO to be attributable to site activities, the proponent shall submit a report detailing the actions to be taken to address the exceedance(s) within 7 days of the proponent being notified in writing of the determination made;
- Once actions to address the identified exceedance(s) have been implemented, the proponent shall monitor the effectiveness of the actions and shall continue until such time as they are advised by the CEO to cease;
- The proponent shall submit all results of the site groundwater monitoring bi-annually or at a frequency deemed sufficient by the CEO until the CEO determines that reporting may cease.
- During construction, the proponent shall ensure that a Construction Environment Management Plan (CEMP) is compiled which details all actions to be taken in the event of incidents involving contaminating activities, (i.e. spills).
- During site operations, the proponent shall ensure that plant inspections, procedures and maintenance are sufficient to identify, prevent and/or minimise releases to the environment, which pose a risk to environmental values.

11. CONCLUSIONS

Based on the investigations undertaken, the following can be concluded:

- The CSM identifies two hydrostratigraphic units beneath the site consisting of a low yielding granophyre bedrock aquifer overlain by a shallow superficial aquifer consisting of a variety of deposits including clays, gravels and calcrete. Both units are unconfined and hydraulically connected.
- Groundwater flow is to the southwest in Site C and to the northwest on Site F, with discharge to the supratidal area and eventually into King Bay to the west. Groundwater is influenced by tidal variations and it is likely that flow direction is altered during periods of high tides.
- The depth to groundwater varies between 0.41 mBTOC and 21.61 mBTOC with surface waters being an expression of groundwater in the supratidal area during periods of groundwater in the supratidal area during periods of high rainfall and following tidal inundation.
- Groundwater in both the granophyre and superficial deposits is of Na-K-Cl type andis brackish to saline in nature with the superficial deposits being significantly more saline due to direct tidal interaction.
- Due to either the low yielding nature of the aquifer (granophyre aquifer) or the high level of salinity (superficial aquifer) groundwater in the area is considered to be of limited beneficial use and environmental value other than for industrial use or supporting marine ecosystems.
- It is understood that no dewatering is to occur during construction and therefore, there is no risk of impacts to groundwater, surrounding groundwater users and the environment from abstraction. However, if dewatering and/or general abstraction are planned, the current monitoring network may be used to gain further data on the groundwater regime (i.e. from aquifer testing) that maybe then used in future analyses (i.e. modelling) to further assess any impacts to the surrounding environment.
- Contamination in groundwater is localised and unlikely to pose a significant risk to surrounding receptors due to the low yield of the granophyre aquifer, which will greatly retard contaminant flow. Other contamination identified within surface water and groundwater (PFAS and Nutrients) are likely to be derived from off-site upgradient sources, (YPN plant).
- The current groundwater monitoring network is considered adequate for assessing both groundwater level and quality variations through time. A groundwater quality monitoring program should be provided to ensure that any impacts during and following development are identified and, if necessary, managed or mitigated.

12. RECOMMENDATIONS

Based on the conclusions, we make the following recommendations:

- If dewatering is required, further investigations should take place with associated groundwater modelling work, if necessary, to ascertain the effects on the environment and to develop suitable management measures to prevent impacts on the surrounding environment and to protect environmental values.
- A monitoring program should be developed which will both further refine the baseline dataset to inform management measures for groundwater and to reflect the relevant conditions of any pollution control licence under the Environmental Protection Act 1986 or similar. The monitoring program should be used to assess groundwater conditions and identify potential impacts both during development and site operations so that any impacts may be managed or mitigated.

13. REFERENCES

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- DoW (2020b) Water Information Resources http://wir.water.wa.gov.au/SitePages/SiteExplorer.aspx. Accessed November 2021
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- Tetra Tech Coffey (2022a) Perdaman Urea Project - Project Destiny, Preliminary Site Investigation for Contamination, January 2022. Report Reference 754-PEREN295751.
- Tetra Tech Coffey (2022b) Perdaman Urea Project - Project Destiny, Sampling, Analysis and Quality Plan, January 2022. Report Reference 754-PEREN295751.
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- Water Resources Council (2004), Draft Policy and Principles, Protection of Waters from Pollution in Western Australia
- Government of Western Australia, Department of Water, 2009: Operational policy no. 5.12 – Hydrogeological reporting associated with a groundwater well licence.
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- World Health Organisation, 2008. Guidelines for Drinking Water Quality. Third Edition Incorporating the First and Second Addenda. Volume 1 Recommendations.
- World Health Organisation, 2008. Petroleum Products in Drinking Water. Background document for development of WHO Guidelines for Drinking Water Quality. Ref: WHO/SDE/WSH/05.08/123.

STATEMENT OF LIMITATIONS

These notes have been prepared by Tetra Tech Coffey to help you to interpret and understand the limitations of this report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Tetra Tech Coffey and applies only to this project and site. Project criteria typically include the general nature of the project; its size and configuration; the location of any structural elements on site; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Tetra Tech Coffey to assess how factors that changed subsequent to the date of the inspection or report affect the report's recommendations. Tetra Tech Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Reliance on external data

External data is often relied upon for Tetra Tech Coffey to generate our reports. This data includes items such as survey data, drawings, reports and geotechnical data. It is the responsibility of the client to ensure that all relevant data is provided to Tetra Tech Coffey. We are not able to independently verify external data and therefore cannot accept responsibility for problems due to the accuracy of external data.

Your report is prepared for specific purposes and persons

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Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Tetra Tech Coffey to work with other project design professionals who are affected by this report. Tetra Tech Coffey can explain the report implications to the design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report

This report as a whole presents the findings of our investigation or design and the report should not be copied in part or altered in any way. Figures, tables, drawings, etc/ are customarily included in our report and are developed by our engineers based on their interpretation of input data. Information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

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FIGURES

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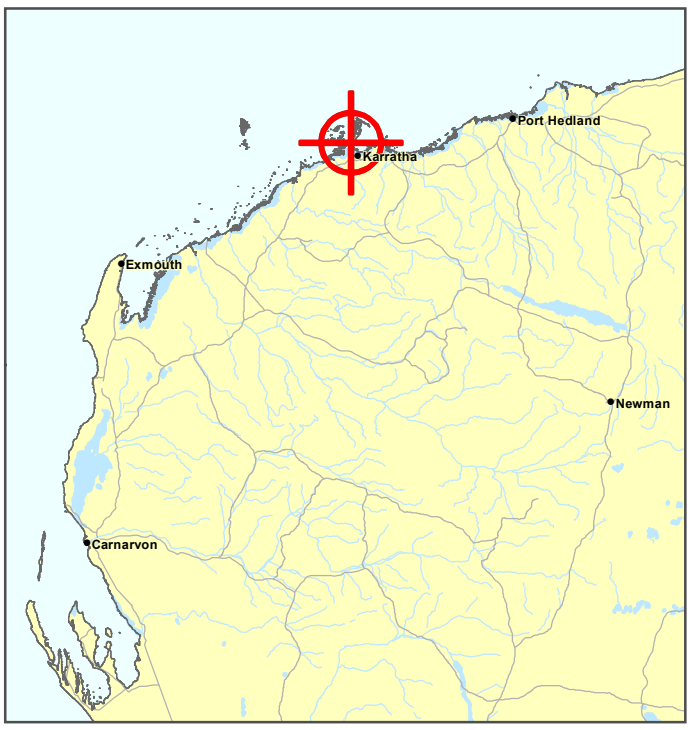

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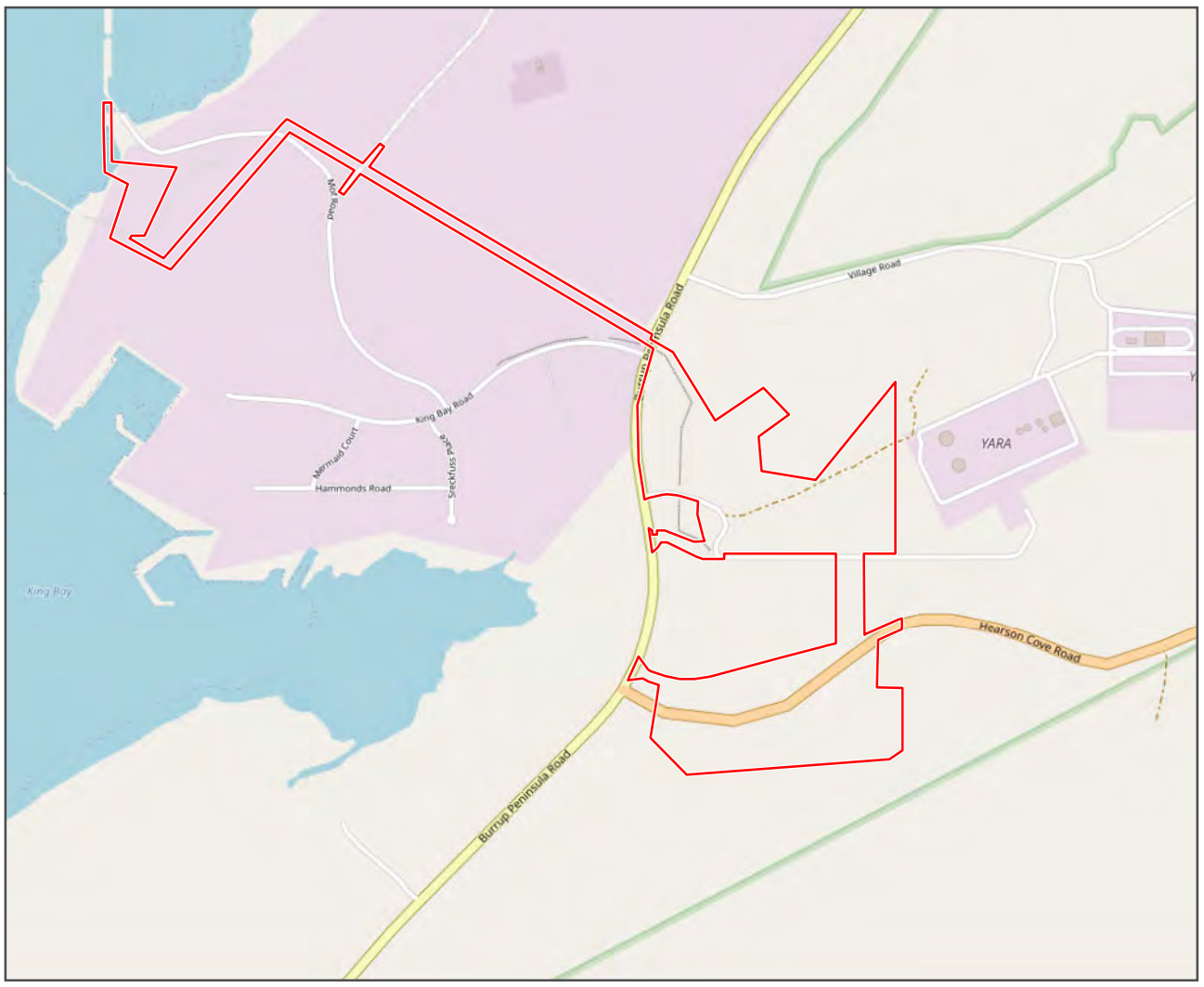
REGIONAL AREA MAP 0 2.5 5 7.5 10 Scale KM IMAGE SOURCE: Travellers Atlas 2006



LOCAL AREA MAP 0 250 500 750 1,000 Scale METRES IMAGE SOURCE: Open Street Map

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

drawn	ENVIRONMAPS
approved	NT
date	24/02/2022
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: CLOUGH ENGINEERING PTY LTD

project: PERDAMAN HYDROGEOLOGICAL BASELINE ASSESSMENT

title: SITE LOCALITY PLAN

project no: 754-PEREN296568 figure no: 1 rev: A

ENVIRONMAPS Environmental Mapping Solutions t: 0406 590 006 www.environmaps.com.au

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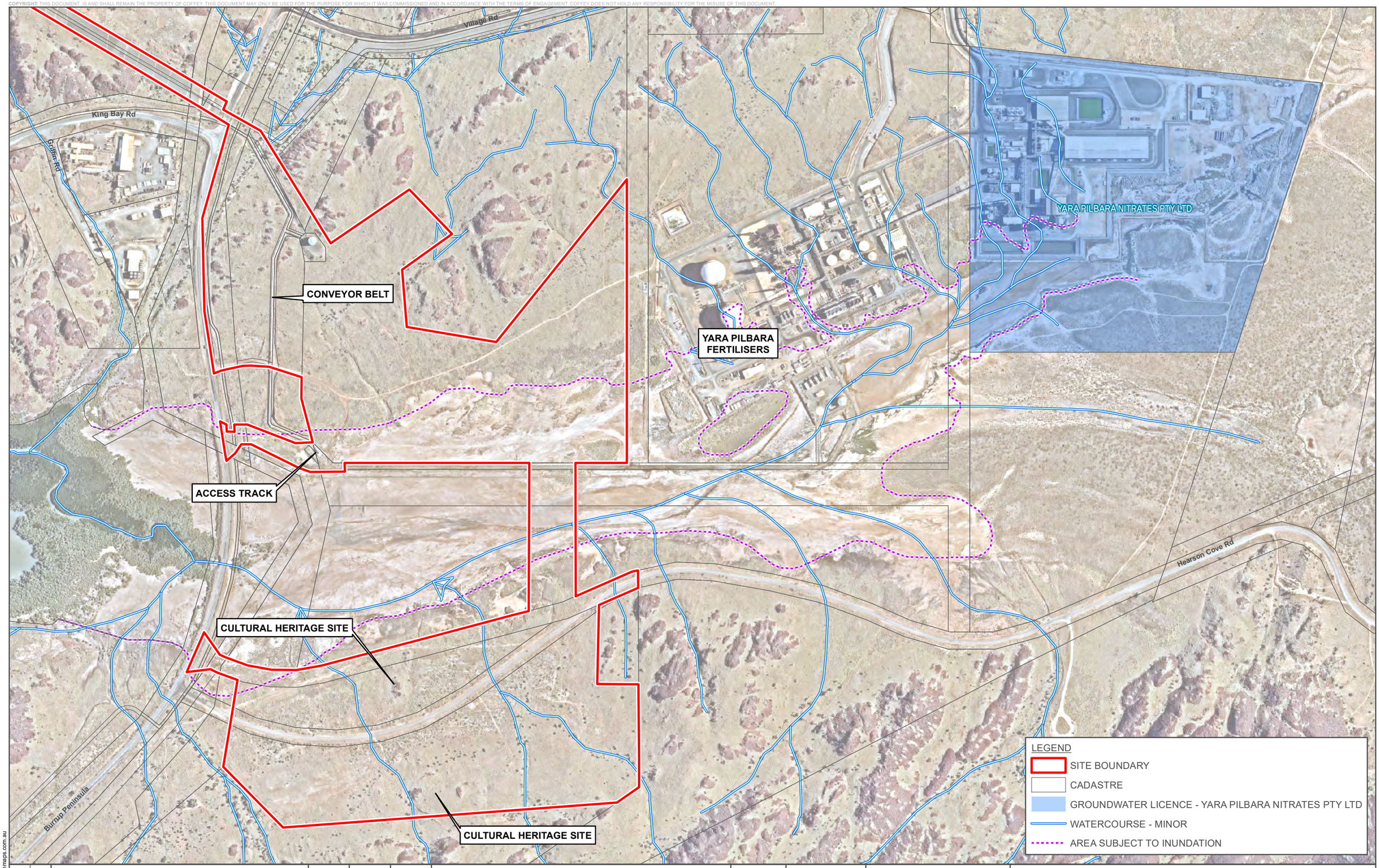

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Scale 1:8,000 (A3) METRES

drawn	ENVIRONMAPS
approved	CV
date	25/02/2022
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: CLOUGH ENGINEERING PTY LTD

project: PERDAMAN HYDROGEOLOGICAL BASELINE ASSESSMENT

title: SITE FEATURES MAP

project no: 754-PEREN296568 | figure no: 2 | rev: A

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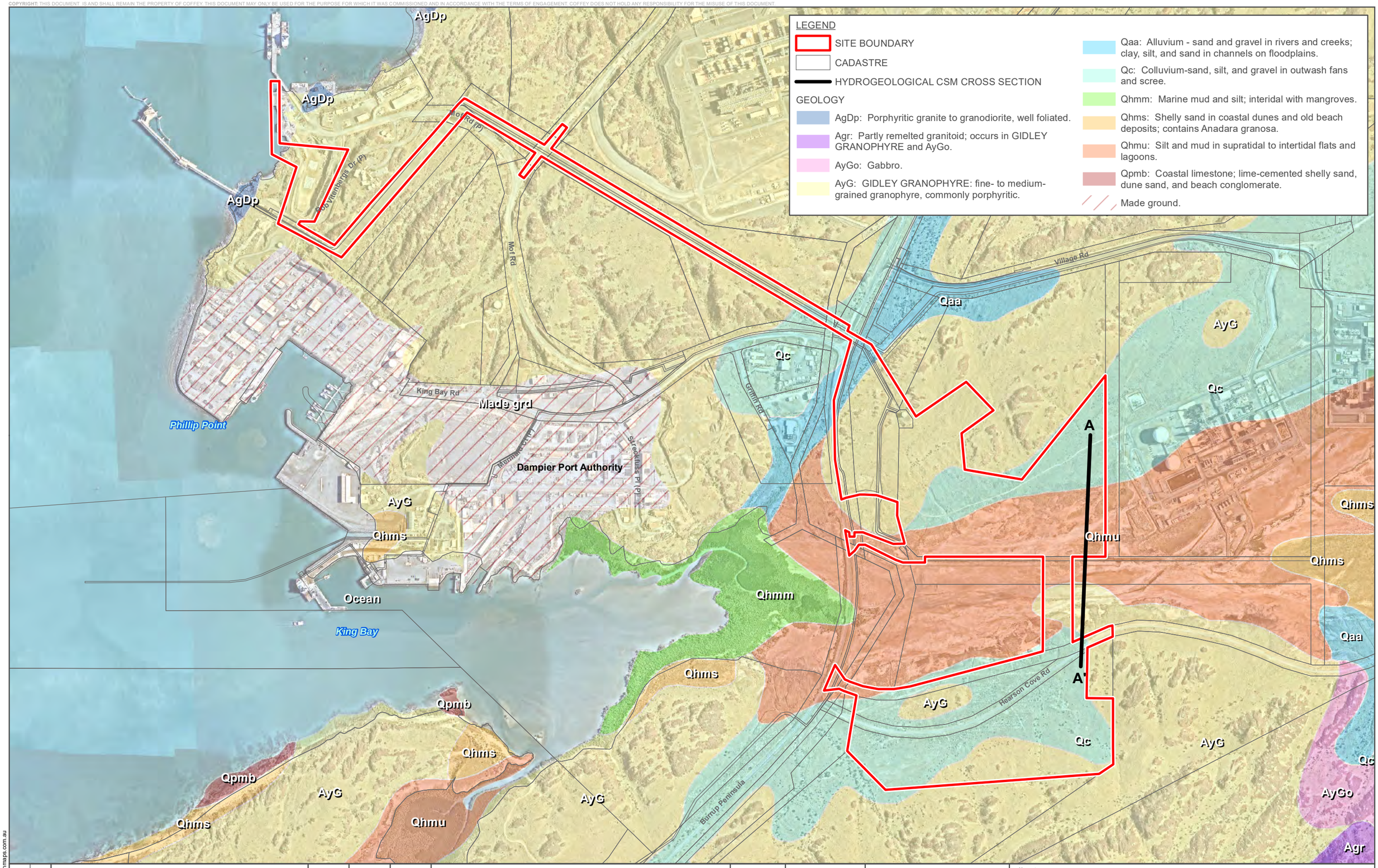

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A	ORIGINAL ISSUE			

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drawn	ENVIRONMAPS
approved	NT
date	24/02/2022
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: CLOUGH ENGINEERING PTY LTD

project: PERDAMAN HYDROGEOLOGICAL BASELINE ASSESSMENT

title: REGIONAL GEOLOGY

project no: 754-PEREN296568 | figure no: 3 | rev: A

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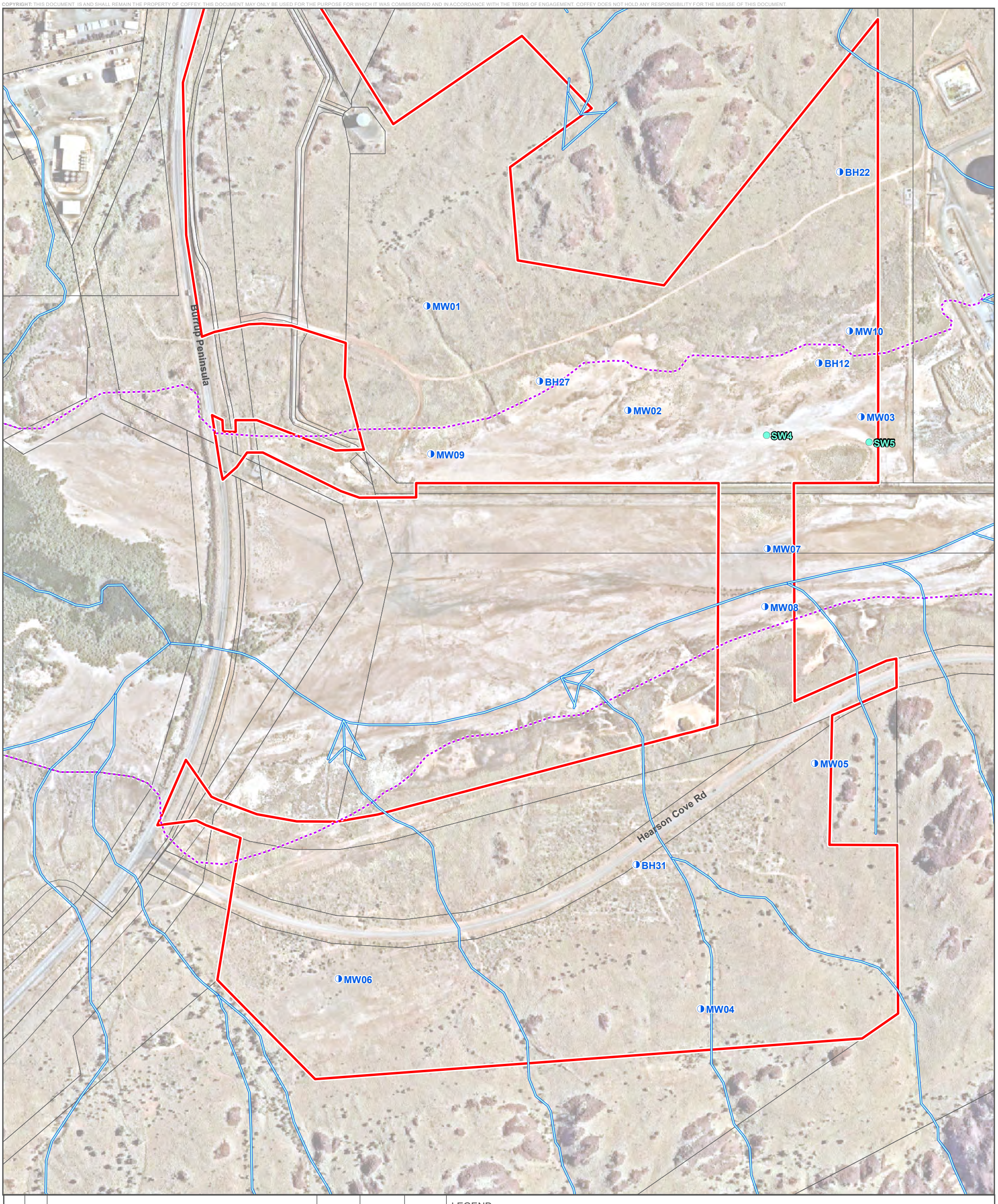

revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE			

LEGEND

- SITE BOUNDARY
- CADASTRE
- WATERCOURSE - MINOR
- AREA SUBJECT TO INUNDATION
- MONITORING WELL
- SURFACE WATER SAMPLE

0 75 150 225 300
Scale 1:5,000 (A3) METRES

drawn	ENVIRONMAPS
approved	NT
date	25/02/2022
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: CLOUGH ENGINEERING PTY LTD

project: PERDAMAN HYDROGEOLOGICAL BASELINE ASSESSMENT

title: MONITORING WELL AND SURFACE WATER SAMPLING LOCATIONS

project no: 754-PEREN296568 | figure no: 4 | rev: A

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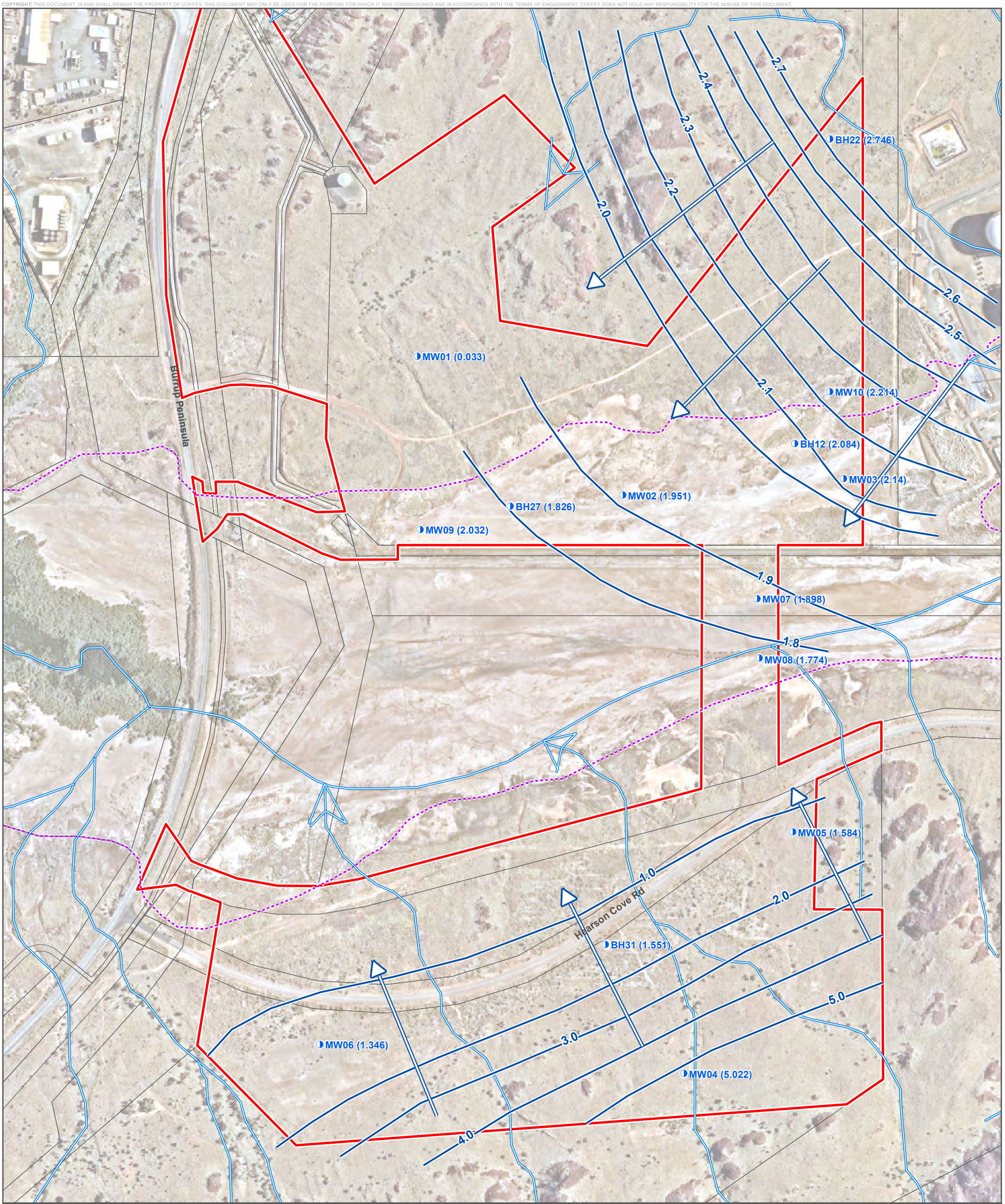

revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE			

LEGEND

- SITE BOUNDARY
- CADASTRE
- WATERCOURSE - MINOR
- AREA SUBJECT TO INUNDATION
- GROUNDWATER CONTOUR (mAHD)
- INDICATIVE GROUNDWATER FLOW DIRECTION
- GROUNDWATER MONITORING WELL
- (5.022) SURVEYED GROUNDWATER LEVEL (mAHD)

0 75 150 225 300
Scale 1:5,000 (A3) METRES

drawn	ENVIRONMAPS
approved	NT
date	24/02/2022
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: CLOUGH ENGINEERING PTY LTD

project: PERDAMAN HYDROGEOLOGICAL BASELINE ASSESSMENT

title: GROUNDWATER CONTOURS (SITE C & SITE F)

project no: 754-PEREN296568 | figure no: 5 | rev: A

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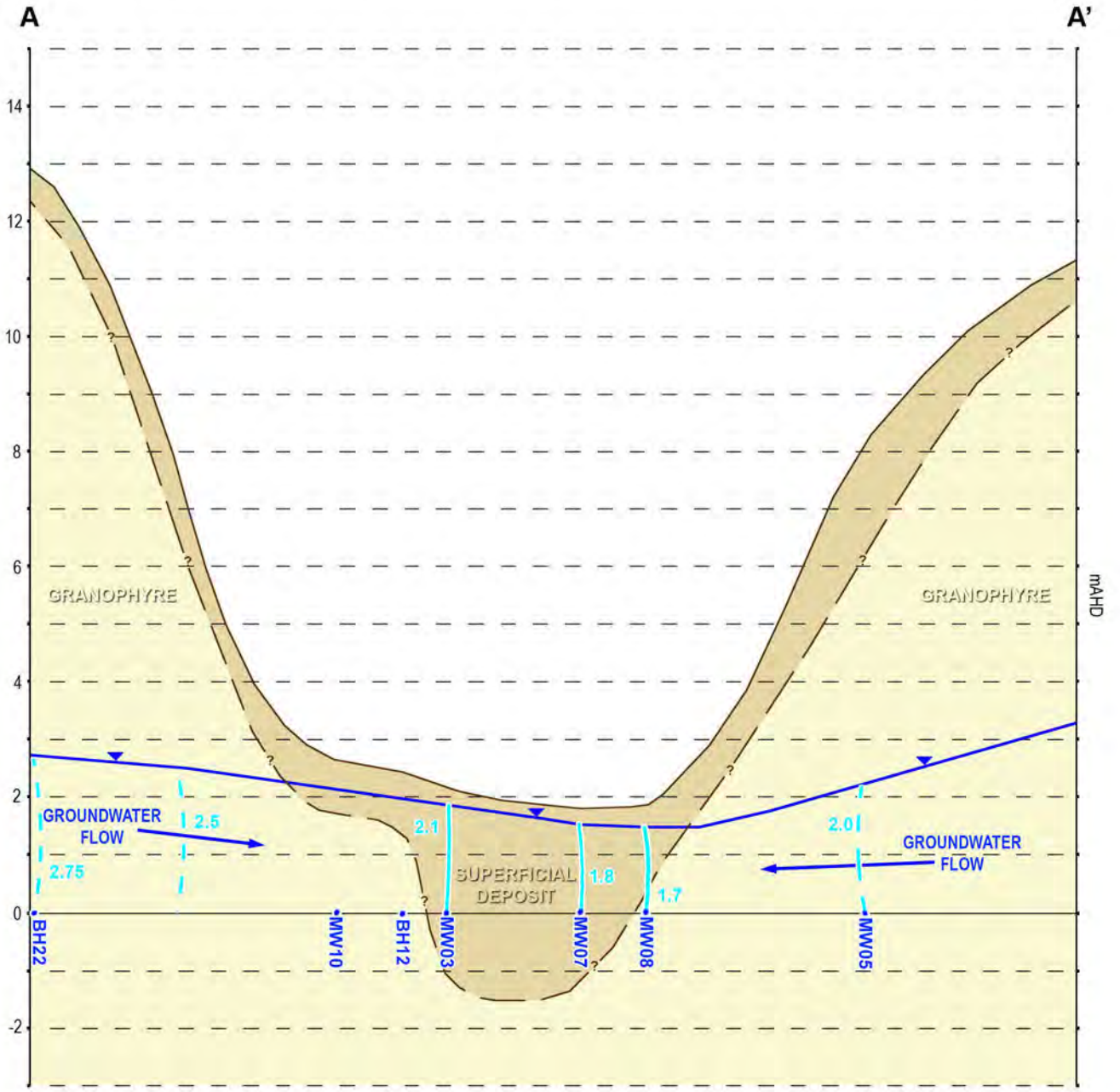

LEGEND

- SUPERFICIAL DEPOSITS
- GRANOPHYRE
- INTERPRETED WATER TABLE
- INTERPRETED HYDRAULIC HEAD (mAHD)

0 50 100 150 200 250
SCALE (A4) METRES

drawn	ENVIRONMAPS	TETRA TECH COFFEY	client:	CLOUGH ENGINEERING PTY LTD	
approved	NT		project:	PERDAMAN HYDROGEOLOGICAL BASELINE ASSESSMENT	
date	25/02/22				
scale	AS SHOWN		title:	HYDROGEOLOGICAL CONCEPTUAL SITE MODEL	
original size	A4		project no: 754-PEREN296568	figure no: 6	rev: A

APPENDIX A: BORELOGS AND SURVEY DATA

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Engineering Log - Borehole

Hole ID.	**BH12**		
sheet:	1 of 2		
project no.	***754-PERGE271567***		
client:	***Clough***	date started:	***24 Aug 2020***
principal:		date completed:	***25 Aug 2020***
project:	***Perdaman Urea Geotechnical Investigation***	logged by:	***JS***
location:	***Dampier***	checked by:	***SE***

position: E: 476766; N: 7718896 (MGA94 Zone 50) surface elevation: 2.50 m (AHD) angle from horizontal: 90°
equipment type: Hydropower drilling fluid: hole diameter : 96 mm

drilling information				well details	material substance								
method & support	penetration 1 2 3	water	samples & field tests	1	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
AD					2				Borehole BH12 continued as cased hole **Gravelly SAND**: fine to coarse grained, non plastic, brown. **COBBLES**: sub-rounded to sub-angular, grey mottled red, with Clay: Highly plastic.			
					1	1.0			**GRANOPHYRE**: fine to coarse grained, grey to dark red, slightly weathered, very low to high strength.			
					0	2.0						
					-1	3.0						
HQ3					-2	4.0						
					-3	5.0			**CALCRETED GRANOPHYRE**: fine to coarse grained, pale brown grey and red, ~30% calcrete veining, moderately weathered, medium to high strength.			
					-4	6.0						
			d=11		-5	7.0			**GRANOPHYRE**: fine to coarse grained, grey to dark red, slightly weathered, medium to extremely high strength.			

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF PIEZOMETER PERDAMAN.GPJ <<DrawingFile>> 18/11/2021 11:11

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HQ3 HQ3 core barrel (61.1mm)
- PQ3 PQ3 core barrel (83.0mm)

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
- M mud
- N nil
- C casing

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Borehole

Hole ID.	**BH12**		
sheet:	2 of 2		
project no.	***754-PERGE271567***		
client:	***Clough***	date started:	***24 Aug 2020***
principal:		date completed:	***25 Aug 2020***
project:	***Perdaman Urea Geotechnical Investigation***	logged by:	***JS***
location:	***Dampier***	checked by:	***SE***

position: E: 476766; N: 7718896 (MGA94 Zone 50) surface elevation: 2.50 m (AHD) angle from horizontal: 90°
equipment type: Hydropower drilling fluid: hole diameter : 96 mm

drilling information				well details	material substance							
method & support	penetration 1 2 3	water	samples & field tests		RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
HQ3			d=9.5 d=11 d=11		-6 -7 -8 -9	9.0 10.0 11.0			**GRANOPHYRE**: fine to coarse grained, grey to dark red, slightly weathered, medium to extremely high strength. *(continued)*			
					-10 -11 -12 -13	12.0 13.0 14.0 15.0			Borehole BH12 terminated at 12.00 m			**well details:** drilling company: Hagstrom **backfill details:** 0.0-11.0m: Sand 11.0-12.0m: Cuttings **standpipe 1 details:** stickup: 0.77m 1.0-11.0m: screen

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HQ3 HQ3 core barrel (61.1mm)
- PQ3 PQ3 core barrel (83.0mm)

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
- M mud
- N nil
- C casing

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Borehole

		Hole ID.	**BH22**
		sheet:	1 of 2
		project no.	**754-PERGE271567**
client:	**Clough**	date started:	**29 Aug 2020**
principal:		date completed:	**29 Aug 2020**
project:	**Perdaman Urea Geotechnical Investigation**	logged by:	**JS**
location:	**Dampier**	checked by:	**SE**

position: E: 476812; N: 7719309 (MGA94 Zone 50) | surface elevation: 12.90 m (AHD) | angle from horizontal: 90°

equipment type: Hydropower | drilling fluid: | hole diameter : 96 mm

drilling information				well details	material substance								
method & support	penetration 1 2 3	water	samples & field tests	1	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
AD									**Sandy Clayey BOULDERS**: sub-rounded to sub-angular, Grey, Fe Staining.			
					12	1.0			**GRANOPHYRE**: fine to coarse grained, grey mottled red, Fe staining in joints and infills, highly weathered, very low to high strength.			
					11	2.0						
					10	3.0			**GRANOPHYRE**: fine to coarse grained, grey mottled red, Iron stained irregular nodules, moderately weathered, very low to extremely high strength.			
HQ3			d=9.9		9	4.0						
			d=10		8	5.0						
		31/08/20 13:00	d=11		7	6.0						
					6	7.0						
					5							

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HQ3 HQ3 core barrel (61.1mm)
- PQ3 PQ3 core barrel (83.0mm)

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
- M mud
- N nil
- C casing

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Borehole

Hole ID.	**BH22**		
sheet:	2 of 2		
project no.	***754-PERGE271567***		
client:	***Clough***	date started:	***29 Aug 2020***
principal:		date completed:	***29 Aug 2020***
project:	***Perdaman Urea Geotechnical Investigation***	logged by:	***JS***
location:	***Dampier***	checked by:	***SE***

position: E: 476812; N: 7719309 (MGA94 Zone 50) surface elevation: 12.90 m (AHD) angle from horizontal: 90°
equipment type: Hydropower drilling fluid: hole diameter : 96 mm

drilling information				well details	material substance							
method & support	penetration 1 2 3	water	samples & field tests		RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
HQ3			d=11		4 3 2 1	9.0 10.0 11.0 12.0			**GRANOPHYRE**: fine to coarse grained, grey mottled red, Iron stained irregular nodules, moderately weathered, very low to extremely high strength. *(continued)*			
					0 -1 -2 -3	13.0 14.0 15.0			Borehole BH22 terminated at 12.00 m			**well details:** drilling company: Hagstrom **backfill details:** 0.0-11.5m: Sand 11.5-12.0m: Cuttings **standpipe 1 details:** stickup: 0.69m 1.0-11.5m: screen

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method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HQ3 HQ3 core barrel (61.1mm)
PQ3 PQ3 core barrel (83.0mm)

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud N nil
C casing

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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Engineering Log - Borehole

Hole ID.	**BH27**		
sheet:	1 of 2		
project no.	***754-PERGE271567***		
client:	***Clough***	date started:	***19 Aug 2020***
principal:		date completed:	***19 Aug 2020***
project:	***Perdaman Urea Geotechnical Investigation***	logged by:	***CS***
location:	***Dampier***	checked by:	***SE***

position: E: 476359; N: 7718878 (MGA94 Zone 50) surface elevation: 2.50 m (AHD) angle from horizontal: 90°
equipment type: Hydropower drilling fluid: hole diameter : 96 mm

drilling information				well details	material substance								
method & support	penetration 1 2 3	water	samples & field tests	1	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
AD								SP-SC	**SAND**: fine grained, non plastic, brown.			
					2				**GRANOPHYRE**: fine to medium grained, grey to dark grey, white banding, moderately weathered to slightly weathered, low to very high strength.			
						1.0						
					1							
						2.0						
			d=0.42		0							
						3.0						
									Clayey gravel, red/grey			
					-1							
									Iron staining			
						4.0						
HQ3			d=0.036		-2							
						5.0						
			d=0.036									
					-3							
						6.0						
					-4							
						7.0						
					-5							

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HQ3 HQ3 core barrel (61.1mm)
- PQ3 PQ3 core barrel (83.0mm)

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
- M mud
- N nil
- C casing

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Borehole

Hole ID.	**BH27**		
sheet:	2 of 2		
project no.	**754-PERGE271567**		
client:	**Clough**	date started:	**19 Aug 2020**
principal:		date completed:	**19 Aug 2020**
project:	**Perdaman Urea Geotechnical Investigation**	logged by:	**CS**
location:	**Dampier**	checked by:	**SE**

position: E: 476359; N: 7718878 (MGA94 Zone 50) surface elevation: 2.50 m (AHD) angle from horizontal: 90°
equipment type: Hydropower drilling fluid: hole diameter : 96 mm

drilling information				well details	material substance							
method & support	penetration 1 2 3	water	samples & field tests		RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
HQ3			d=0.099 d=0.29 d=2.3		-6 -7 -8 -9	9.0 10.0 11.0			**GRANOPHYRE**: fine to medium grained, grey to dark grey, white banding, moderately weathered to slightly weathered, low to very high strength. *(continued)* 10.5 m: becoming brown grey 11.0 m: grey 11.5 m: brown			
					-10 -11 -12 -13	12.0 13.0 14.0 15.0			Borehole BH27 terminated at 12.00 m			**well details:** drilling company: Hagstrom **backfill details:** 0.0-12.0m: Sand **standpipe 1 details:** stickup: 0.59m 1.0-12.0m: screen

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HQ3 HQ3 core barrel (61.1mm)
- PQ3 PQ3 core barrel (83.0mm)

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
- M mud
- N nil
- C casing

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Hole ID.	**BH31**		
sheet:	1 of 2		
project no.	**754-PERGE271567**		
client:	**Clough**	date started:	**31 Oct 2020**
principal:		date completed:	**31 Oct 2020**
project:	**Perdaman Urea Geotechnical Investigation**	logged by:	**RP**
location:	**Dampier**	checked by:	**SE**

position: E: 476499; N: 7718179 (MGA94 Zone 50) surface elevation: 9.30 m (AHD) angle from horizontal: 90°
equipment type: HanJIN D&B 8-D drilling fluid: hole diameter : 96 mm

drilling information				well details	material substance							
method & support	penetration 1 2 3	water	samples & field tests	1	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
AD					9				**FILL / SAND**: fine grained, Brown.	D	MD	
						1.0			**FILL / CLAYEY GRAVEL WITH COBBLES**: red-brown mottled grey.		MD	
					8							
						2.0			**NO CORE:** 0.70m (1.50-2.20 m)			
					7				**GRANOPHYRE**: fine to medium grained, brown to grey, iron staining, moderately weathered to slightly weathered, low - extremely high strength. Clay/Gravel infill			
						3.0			Grey, with iron staining in joints			
					6							
						4.0						
					5							
						5.0						
					4							
						6.0						
					3							
						7.0						
					2							
HQ3												

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HQ3 HQ3 core barrel (61.1mm)
PQ3 PQ3 core barrel (83.0mm)

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud N nil
C casing

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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Engineering Log - Borehole

Hole ID.	***BH31***		
sheet:	2 of 2		
project no.	***754-PERGE271567***		
client:	***Clough***	date started:	***31 Oct 2020***
principal:		date completed:	***31 Oct 2020***
project:	***Perdaman Urea Geotechnical Investigation***	logged by:	***RP***
location:	***Dampier***	checked by:	***SE***

position: E: 476499; N: 7718179 (MGA94 Zone 50) surface elevation: 9.30 m (AHD) angle from horizontal: 90°
equipment type: HanJIN D&B 8-D drilling fluid: hole diameter : 96 mm

drilling information				well details	material substance								
method & support	penetration 1 2 3	water	samples & field tests		RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
HQ3					1 0 -1 -2	9.0 10.0 11.0			**GRANOPHYRE**: fine to medium grained, brown to grey, iron staining, moderately weathered to slightly weathered, low - extremely high strength. *(continued)* 9.0 to 9.5 m: Concentric drill bit markings on core			
					-3 -4 -5 -6	12.0 13.0 14.0 15.0			Borehole BH31 terminated at 12.00 m			**well details:** drilling company: Edge Drilling **backfill details:** 0.0-12.0m: Sand **standpipe 1 details:** 1.0-12.0m: screen

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method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HQ3 HQ3 core barrel (61.1mm)
PQ3 PQ3 core barrel (83.0mm)

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
N nil
C casing

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Log - Monitoring Well

		Hole ID.	***MW02***
		sheet:	1 of 1
		project no.	***754-PEREN296568***
client:	***Clough***	date started:	***25 Jan 2022***
principal:	***Cameron Baldock***	date completed:	***25 Jan 2022***
project:	***Perdaman Hydrological Drilling***	logged by:	***NT***
location:	***The Perdaman site, Burrup Road, Burrup WA***	checked by:	***BW***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: | drilling fluid: | hole diameter : 150 mm

drilling information | **well details** | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	MW02	depth (m)	graphic log	classification symbol	material description **SOIL TYPE** plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
HS	25-01-22	E			0.5 1.0 1.5 2.0 2.5			**SAND CLAY**: medium grained, brown to pale brown, moderately sorted with cobbles of granophyre in places.			No visual or olfactory evidence of contamination
						+ +		**GRANOPHYRE**: grey, staline and fresh in nature.			
					3.0 3.5 4.0 4.5			Monitoring Well MW02 terminated at 2.80 m			**backfill details:** 0.0-0.2m: Bentonite 0.2-2.8m: Sand **standpipe piezo. MW02 details:** 0.4-2.8m: screen

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method

AD	auger drilling*
AS	auger screwing*
HA	hand auger
MR	mud rotary
W	washbore
AH	air hammer
HS	hand auger hollow stem flight auger
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

ALT	air lift test
B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
PID	photoionization detector
R	refusal

classification symbol & soil description
based on Unified Classification System

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Monitoring Well

		Hole ID.	***MW03***
		sheet:	1 of 1
		project no.	***754-PEREN296568***
client:	***Clough***	date started:	***26 Jan 2022***
principal:	***Cameron Baldock***	date completed:	***26 Jan 2022***
project:	***Perdaman Hydrological Drilling***	logged by:	***NT***
location:	***The Perdaman site, Burrup Road, Burrup WA***	checked by:	***BW***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: | drilling fluid: | casing diameter : PVC

drilling information | **well details** | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	MW03	depth (m)	graphic log	classification symbol	material description **SOIL TYPE** plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
HS PVC casing	26-01-22	E: SS14_0 E: SS14_0.5 E: SS14_1 E: SS14_2			0.5 1.0 1.5 2.0 2.5 3.0			**CLAY**: brown, very sloppy. **CLAY**: high plasticity, pink brown. **CALCRETE**: red brown white, molted, calcareous with dark grey parts of granophyre material.			little or no returns no visual or olfactory evidence of contamination well slotted to sureface with gravel to surface, plinth placed around PVC for protectoin followed by cement
					3.5 4.0 4.5			Monitoring Well MW03 terminated at 3.00 m			**backfill details:** 0.0-3.0m: Sand **standpipe piezo. MW03 details:** 0.0-2.5m: screen

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method

AD	auger drilling*
AS	auger screwing*
HA	hand auger
MR	mud rotary
W	washbore
AH	air hammer
HS	hand auger hollow stem flight auger
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

ALT	air lift test
B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
PID	photoionization detector
R	refusal

classification symbol & soil description
based on Unified Classification System

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Hand Auger

		Hole ID.	***MW07***
		sheet:	1 of 1
		project no.	***754-PEREN296568***
client:	***Clough***	date started:	***26 Jan 2022***
principal:	***Cameron Baldock***	date completed:	***26 Jan 2022***
project:	***Perdaman Hydrological Drilling***	logged by:	***NT***
location:	***The Perdaman site, Burrup Road, Burrup WA***	checked by:	***BW***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: | hole diameter : 150 mm

drilling information				well details	material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)	MW07	depth (m)	graphic log	classification symbol	material description **SOIL TYPE** plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
HA N	26-01-22	E: SS12_0 E: SS12_0.5			0.5			**SAND CLAY**: fine grained, brown, very soft and saturated.			monitoring well slots surrounded by permeable sock, no gravel
								CLAY: grey black, granophyre fragments present.			monitoring well slots surrounded by permeable sock, no gravel
		E: SS12_1.0			1.0			Hand Auger MW07 terminated at 1.00 m			**backfill details:** 0.0-1.0m: Sand **standpipe piezo. MW07 details:** 0.0-1.0m: screen
					1.5						
					2.0						
					2.5						
					3.0						
					3.5						
					4.0						
					4.5						

method

AD	auger drilling*
AS	auger screwing*
HA	hand auger
MR	mud rotary
W	washbore
AH	air hammer
HS	hand auger hollow stem flight auger
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown

water inflow

water outflow

samples & field tests

ALT	air lift test
B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
PID	photoionization detector
R	refusal

classification symbol & soil description
based on Unified Classification System

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Environmental Log - Hand Auger

		Hole ID.	***MW08***
		sheet:	1 of 1
		project no.	***754-PEREN296568***
client:	***Clough***	date started:	***26 Jan 2022***
principal:	***Cameron Baldock***	date completed:	***26 Jan 2022***
project:	***Perdaman Hydrological Drilling***	logged by:	***NT***
location:	***The Perdaman site, Burrup Road, Burrup WA***	checked by:	***BW***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: | hole diameter : 150 mm

drilling information				well details	material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)	MW08	depth (m)	graphic log	classification symbol	material description **SOIL TYPE** plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
HA N	26-01-22	E: SS13_0 E: SS13_0.5 E: SS13_0.75			0.5			**SAND GRAVEL**: sub-rounded to sub-angular, red brown, poorly graded, grains of granophyre, QTE and shell fragments. **CLAY**: brown, contains fragments of calcrete.			no visual or olfactory evidence of contamination monitoring well slots surrounded by permeable sock, no gravel
					1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5			Hand Auger MW08 terminated at 0.75 m			**backfill details:** 0.0-0.75m: Sand **standpipe piezo. MW08 details:** 0.0-0.75m: screen

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method

AD	auger drilling*
AS	auger screwing*
HA	hand auger
MR	mud rotary
W	washbore
AH	air hammer
HS	hand auger hollow stem flight auger
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

ALT	air lift test
B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
PID	photoionization detector
R	refusal

classification symbol & soil description
based on Unified Classification System

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Monitoring Well

		Hole ID.	***MW09***
		sheet:	1 of 1
		project no.	***754-PEREN296568***
client:	***Clough***	date started:	***24 Jan 2022***
principal:	***Cameron Baldock***	date completed:	***24 Jan 2022***
project:	***Perdaman Hydrological Drilling***	logged by:	***NT***
location:	***The Perdaman site, Burrup Road, Burrup WA***	checked by:	***BW***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: | drilling fluid: | hole diameter : 150 mm

drilling information | **well details** | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	MW09	depth (m)	graphic log	classification symbol	material description **SOIL TYPE** plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
HS		E: SS23_0						**CLAY GRAVEL**: sub-rounded to sub-angular, red brown, fragments of granophyre in a silty clay matrix with shells.			no visual or olfactory evidence of contamination
	24-01-22	E: SS23_0.5			0.5			**CLAY**: brown, with occasional fragments of calcrete.			
		E: SS23_1			1.0			**CLAY**: grey, with rock fragments of granophyre.			ground became harder after 1.1 m with mere rocks present, likely weathered bedrock
					1.5			**CLAY**: cream, with rock fragments of granophyre.			
					2.0						
					2.5						
					3.0						
					3.5			Monitoring Well MW09 terminated at 3.40 m			**backfill details:** 0.0-0.4m: Bentonite 0.4-3.4m: Sand **standpipe piezo. MW09 details:** 0.4-3.4m: screen
					4.0						
					4.5						

method

AD	auger drilling*
AS	auger screwing*
HA	hand auger
MR	mud rotary
W	washbore
AH	air hammer
HS	hand auger hollow stem flight auger
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown

water inflow

water outflow

samples & field tests

ALT	air lift test
B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
PID	photoionization detector
R	refusal

classification symbol & soil description
based on Unified Classification System

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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TETRA TECH COFFEY

Environmental Log - Monitoring Well

		Hole ID.	***MW10***
		sheet:	1 of 1
		project no.	***754-PEREN296568***
client:	***Clough***	date started:	***27 Jan 2022***
principal:	***Cameron Baldock***	date completed:	***27 Jan 2022***
project:	***Perdaman Hydrological Drilling***	logged by:	***NT***
location:	***The Perdaman site, Burrup Road, Burrup WA***	checked by:	***BW***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: | drilling fluid: | hole diameter : 150 mm

drilling information | **well details** | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	MW10	depth (m)	graphic log	classification symbol	material description **SOIL TYPE** plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
AH	27-01-22				0.5			**CLAY GRAVEL**: sub-rounded to sub-angular, pink brown, poorly sorted, fragments of granophyre and minor calcrete in a clay matrix.			no visual or olfactory evidence of contamination
					1.0			**CALCRETISED GRANOPHYRE** grey, minor calcrete and clay, weathering evident.			increase in water flow
					1.5						
					2.0			**GRANOPHYRE** grey, weathered, fracturing evident, extreme stalline texture.			small fractures evident
					2.5						
					3.0						
					3.5						
					4.0						
					4.5			Monitoring Well MW10 terminated at 4.50 m			**backfill details:** 0.0-2.0m: Sand 2.0-4.5m: Cuttings **standpipe piezo. MW10 details:** 0.4-2.0m: screen

method

AD	auger drilling*
AS	auger screwing*
HA	hand auger
MR	mud rotary
W	washbore
AH	air hammer
HS	hand auger hollow stem flight auger
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

ALT	air lift test
B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
PID	photoionization detector
R	refusal

classification symbol & soil description
based on Unified Classification System

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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TETRA TECH COFFEY

Environmental Log - Monitoring Well

Hole ID.	***MW01***
sheet:	1 of 1
project no.	***754-PEREN296568***
date started:	***18 Jan 2021***
date completed:	***18 Jan 2021***
logged by:	***NT***
checked by:	

client: ***Clough***

principal: ***Cameron Baldock***

project: ***Perdaman Hydrological Drilling***

location: ***The Perdaman site, Burrup Road, Burrup WA***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: | drilling fluid: | hole diameter : 150 mm

drilling information				well details	material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)	MW01	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
AH					0.0–2.0		GP	**CLAYEY GRAVEL**: poorly sorted, sub-angular to angular, brown, fragments of grey and green granophyre in clay matrix.			
					2.0–3.0			**GRANOPHYRE BOULDERS**: brown, granophyre boulders in clay matrix.			Difficulty in drilling.
					3.0–9.0			**GRANOPHYRE**: medium grained, grey, crystalline, moderate alteration, green, orange and red staining. weathered.			Increased clay content. Orange staining. Varing levels of alteration. Becoming fresher.
					9.0			Monitoring Well MW01 terminated at 9.00 m			**backfill details:** 0.0-9.0m: Sand **standpipe piezo. MW01 details:** 3.0-9.0m: screen

method

AD	auger drilling*
AS	auger screwing*
HA	hand auger
MR	mud rotary
W	washbore
AH	air hammer
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown

water inflow

water outflow

samples & field tests

ALT	air lift test
B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
PID	photoionization detector
R	refusal

classification symbol & soil description
based on Unified Classification System

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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TETRA TECH COFFEY

Environmental Log - Monitoring Well

Hole ID.	***MW04***
sheet:	1 of 1
project no.	***754-PEREN296568***
client:	***Clough***
date started:	***14 Jan 2021***
principal:	***Cameron Baldock***
date completed:	***14 Jan 2021***
project:	***Perdaman Hydrological Drilling***
logged by:	***NT***
location:	***The Perdaman site, Burrup Road, Burrup WA***
checked by:	

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: | drilling fluid: | hole diameter : 150 mm

drilling information				well details	material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)	MW04	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
AH	Dry							**GRANOPHYRE BOULDERS**: grey and red, crystalline grey matrix with red iron staining.			
					2.0			**CALCRETISED GRANOPHYRE**: grey and purple, crystaline grey matrix with pink weathered calcrete.			Minor calcrete.
								GRANOPHYRE: grey, crystalline fragments, sparkly in appearance.			Minor iron staining.
					4.0						
											Minor alteration - clay (grey).
					6.0						
					8.0						
					10.0						
					12.0						
					14.0						
					16.0						
					18.0						
					20.0						
								Monitoring Well MW04 terminated at 21.00 m			**backfill details:** 0.0-2.0m: Bentonite 2.0-21.0m: Sand **standpipe piezo. MW04 details:** 12.0-21.0m: screen
					22.0						

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method

AD	auger drilling*
AS	auger screwing*
HA	hand auger
MR	mud rotary
W	washbore
AH	air hammer
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

ALT	air lift test
B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
PID	photoionization detector
R	refusal

classification symbol & soil description
based on Unified Classification System

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Monitoring Well

Hole ID.	***MW05***
sheet:	1 of 1
project no.	***754-PEREN296568***
date started:	***15 Dec 2021***
date completed:	***15 Dec 2021***
logged by:	***NT***
checked by:	

client: ***Clough***

principal: ***Cameron Baldock***

project: ***Perdaman Hydrological Drilling***

location: ***The Perdaman site, Burrup Road, Burrup WA***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: | drilling fluid: | hole diameter : 150 mm

drilling information				well details	material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)	MW05	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
AH	15/12/22							**CLAYEY GRAVEL**: poorly sorted, rounded to sub-angular, orange-brown, fragments of granophyre, mnior clacrete and clay.			
					2.0			**GRANOPHYRE**: grey, grey crystalline fragments with red iron staining.			
					4.0						
					6.0						Minor clays, brown in colour. Minor pink staining and minor clay.
					8.0						
					10.0						Becoming fresher. Minor pink staining.
					12.0						
					14.0						
					16.0						
					18.0			Monitoring Well MW05 terminated at 18.00 m			**backfill details:** 0.0-1.0m: Bentonite 1.0-18.0m: Sand **standpipe piezo. MW05 details:** 3.0-18.0m: screen

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method

AD	auger drilling*
AS	auger screwing*
HA	hand auger
MR	mud rotary
W	washbore
AH	air hammer
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown

water inflow

water outflow

samples & field tests

ALT	air lift test
B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
PID	photoionization detector
R	refusal

classification symbol & soil description
based on Unified Classification System

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Monitoring Well

Hole ID.	***MW06***		
sheet:	1 of 1		
project no.	***754-PEREN296568***		
client:	***Clough***	date started:	***16 Dec 2021***
principal:	***Cameron Baldock***	date completed:	***16 Dec 2021***
project:	***Perdaman Hydrological Drilling***	logged by:	***NT***
location:	***The Perdaman site, Burrup Road, Burrup WA***	checked by:	

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: | drilling fluid: | hole diameter :

drilling information | **well details** | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	MW06	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
AH							GP	**CLAYEY GRAVEL**: poorly sorted, sub-rounded to sub-angular, red-brown, seashells present.			
					2.0		Cl	**CLAY**: red-brown, granophyte cobbles present.			
					4.0		GP	**CLAYEY GRAVEL**: poorly sorted, sub-angular to angular, red-brown, fragments of granophyre, shelly fragments also present.			Iron staining and green staining on granophyre fragments. Light brown colour.
					6.0			**CALCRETISED GRANOPHYRE**: pale grey-cream, tan coloured calcrete.			
								GRANOPHYRE: pale grey to dark grey, minor calcrete.			
					8.0			**GRANOPHYRE**: grey, altered/weathered, minor oxidised claey pale and red fragments.			Evidence of minor alteration - iron staining.
	16/12/21				10.0						
					12.0			Monitoring Well MW06 terminated at 11.00 m			**backfill details:** 0.0-1.0m: Bentonite 1.0-11.0m: Sand **standpipe piezo. MW06 details:** 8.0-11.0m: screen

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- MR mud rotary
- W washbore
- AH air hammer

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- ALT air lift test
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- PID photoionization detector
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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HS Document Ref: 5414-0008-SVY-RPT-001-R01

Report of Survey

Monitoring Wells

Perdaman Urea and Fertiliser Project

Saipem Clough JV

Scope of Works: Handley Surveys have undertaken a survey of 14 ground water monitoring wells. Survey points were observed on the top of PVC casing and at ground level.

Instrumentation: Survey works were conducted utilising the following instrumentation:

- Trimble R10 & R12 GNSS (Serial No. R12 6106F00647 & R10 5251421728) with a manufacturers stated accuracy of ±8mm + 1ppm for horizontal and ±15mm + 1ppm for vertical.

Horizontal Datum: Map Grid of Australia (MGA94) - Zone 50

Vertical Datum: Australian Height Datum (AHD)

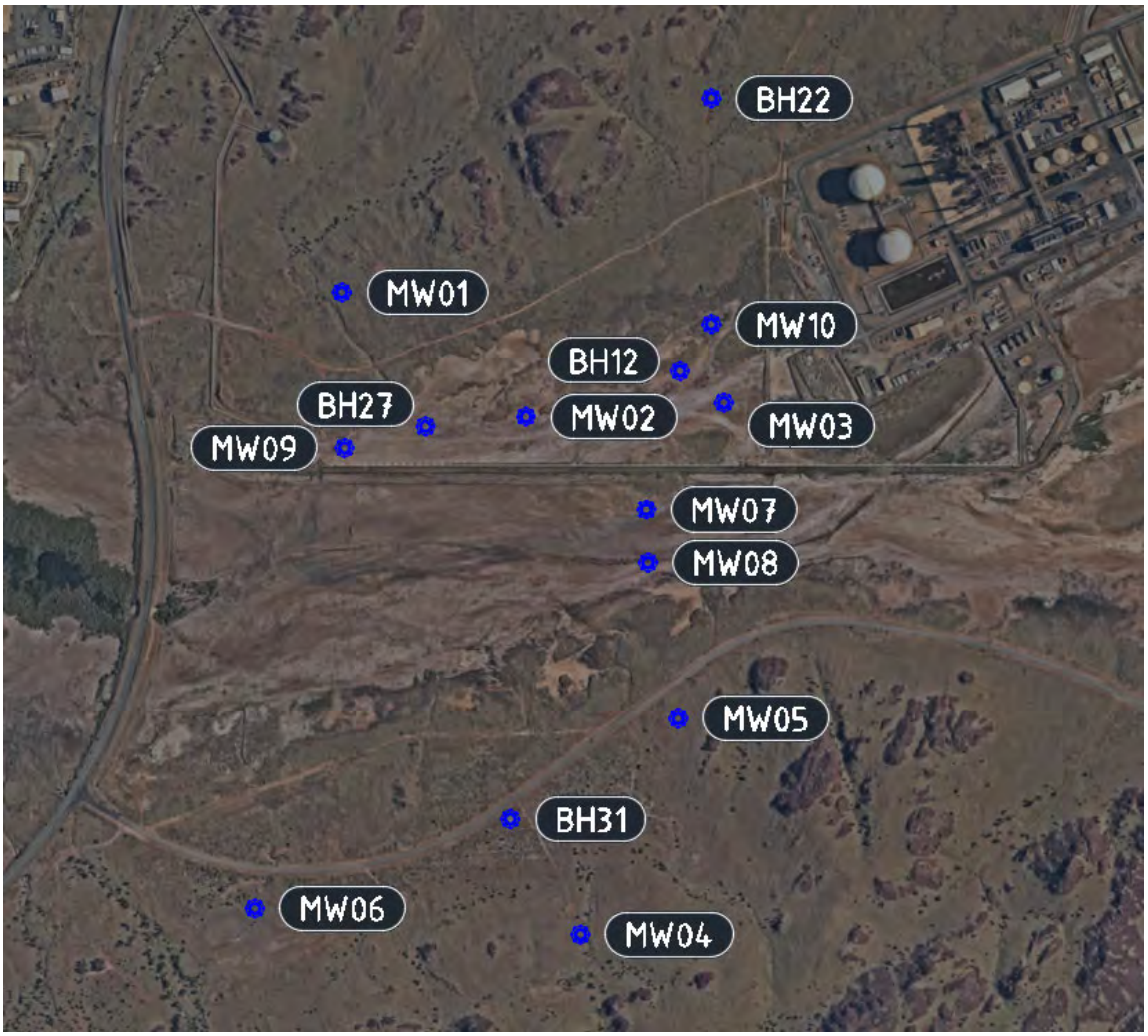
Horizontal Datum Point: Dampier 141
E 475982.482
N 7719762.272
RL 26.519

Date of Survey: 14th & 15th of February 2022

Surveyed By: C. Barton

Deliverables:		
	5414-0008-SVY-RPT-001-R00	This document
	5414-0008-SVY-DAT-001-R00	Coordinate spreadsheet of surveyed points

Perdaman Urea and Fertiliser Project – Locality Sketch



Coordinates – Perdaman Urea and Fertiliser Project

Point ID	Easting (MGA)	Northing (MGA)	Elevation (AHD)	Comments	Ref Diagram*
MW01	476228.470	7719009.571	7.923	Top of Casing (PVC)	Type D
			7.079	Ground Level	
MW02	476519.248	7718812.931	2.766	Top of Casing (PVC)	Type D
			2.151	Ground Level	
MW03	476831.778	7718835.973	2.690	Top of Casing (PVC)	Type D
			2.225	Ground Level	
MW04	476605.629	7717994.051	16.588	Top of Casing (PVC)	Type D
			15.830	Ground Level	
MW05	476759.793	7718336.059	9.209	Top of Casing (PVC)	Type D
			8.292	Ground Level	
MW06	476090.716	7718035.353	7.851	Top of Casing (PVC)	Type D
			6.918	Ground Level	
MW07	476709.268	7718666.274	2.813	Top of Casing (PVC)	Type E
			1.929	Ground Level	
MW08	476712.205	7718582.203	2.904	Top of Casing (PVC)	Type E
			1.979	Ground Level	
MW09	476232.717	7718764.131	2.442	Top of Casing (PVC)	Type D
			1.987	Ground Level	
MW10	476812.205	7718959.099	3.224	Top of Casing (PVC)	Type D
			2.725	Ground Level	
BH12	476762.865	7718885.787	3.229	Top of Casing (PVC)	Type D
			2.456	Ground Level	
BH22	476812.383	7719316.829	13.701	Top of Casing (PVC)	Type D
			12.996	Ground Level	
BH27	476360.159	7718797.480	2.686	Top of Casing (PVC)	Type D
			2.092	Ground Level	
BH31	476494.894	7718176.630	9.921	Top of Casing (PVC)	Type D
			9.283	Ground Level	

** See Page 9 for Reference Diagrams*

Site Photos - Perdaman Urea and Fertiliser Project

MW01

MW02

MW03

MW04

MW05

MW06

MB07

MB08

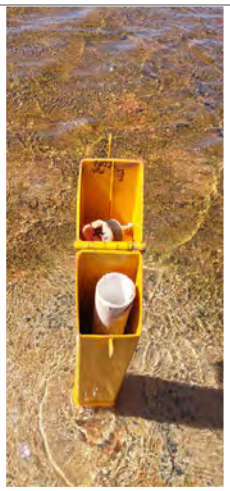
MB09

MB10

BH12

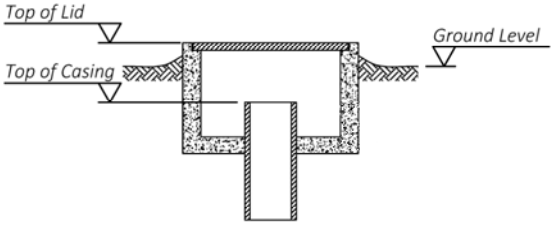
BH22

BH27

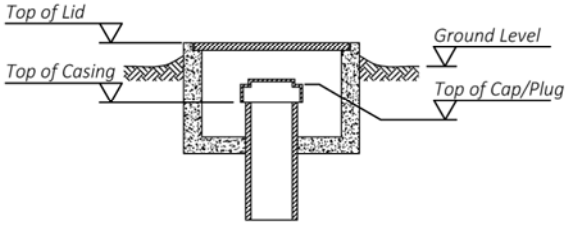


BH31

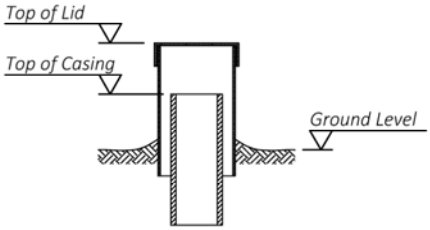
Reference Diagrams:



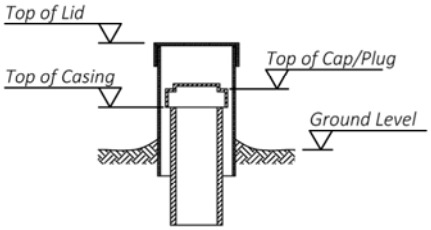
TYPE A
Flush Mounted Well with no Cap/Plug



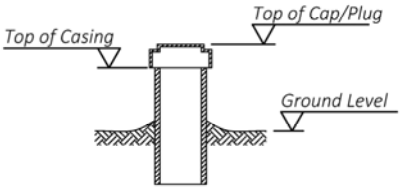
TYPE B
Flush Mounted Well with Cap/Plug



TYPE C
Monument Well with no Cap/Plug



TYPE D
Monument Well with Cap/Plug



TYPE E
Exposed Well with Cap/Plug

APPENDIX B: GROUNDWATER WELL INSTALLATION METHODOLOGY

Groundwater Well Installation Methodology

Activity	Details
Date of field activities	24th January – 31st January 2022
Review of service plans and Non-Destructive Digging (NDD)	Service plans of each area from 'Dial Before You Dig' were reviewed prior to drilling and a service locator (Westscan) was used to identify underground services.
Drilling method	Hollow Stem Auger and Air Hammer
Soil logging	Soil type classifications and descriptions are based on the Unified Soil Classification System (USCS). Drilling logs are included in Appendix B.
Decontamination procedure	Drill rods and equipment were thoroughly washed between each location to prevent cross contamination.
Groundwater well target depths	The monitoring bores were installed with 3m of screen for most locations and 6m of screen in clay dominant formations. Actual groundwater depths and monitoring well construction details are summarised on the monitoring well logs presented within Appendix A.
Well construction	All monitoring bores were constructed using 50mm diameter uPVC pipe with screens will consisting of Class 18 threaded uPVC pipe. The monitoring well screen was sealed at the base with an uPVC cap. The annular space between the well screen and the bore wall was completed with pre-packed screen and backfilled with clean, washed, well graded, predominantly silica sand (filter material), of a size compatible with the geological unit monitored. Filter material is uniformly graded and of an appropriate size range so that no significant loss of filter material occurred during development. A minimum of an approximately 500mm thick bentonite 'seal' was installed approximately 500mm above the slotted section, formed from pure bentonite pellets. The annulus was then backfilled with concrete grout to the surface, then sealed with a concrete plug to prevent preferential off surface flow. A protective steel lockable column was installed over the monitoring well and a concrete plinth was emplaced to around 200mm above ground level. other means). The bore ID numbers were written on the outside cap of the protective casing.
Well development	Monitoring bores were developed after installation using an electric submersible pump to facilitate removal of fine sediment/drilling debris from the well.
Well survey	Monitoring wells were professionally surveyed (+/-2mm) for top of casing (TOC) elevation to m AHD and location in GDA94. Survey results are included within Appendix A.

APPENDIX C: FIELD SHEETS AND QC/QC LOGS

ECO Environmental

Environmental Monitoring & Sampling Equipment Rentals and sales.

Tel: +61 8 9328 2900
fax: +61 8 9328 2677
eco@ecoenvironmental.com.au
www.ecoenvironmental.com.au

EQUIPMENT INFORMATION

Instrument: YSIPP2

Serial Number: 19K102538 (Display)

Lot Number: 20B140267 (Sonde)

EQUIPMENT CHECK	Enclosed	Returned	Comment
YSI Pro Plus Display	✓		
YSI Quatro Sonde	✓		
Flow Cell	✓		
Probe Guard	✓		
Rubber Storage/Calibration Sleeve	✓		
Calibration Cup + Cap	✓		
YSI Pro Series ProComm II Kit	✓		
USB Software, Instruction Manual & Field Sheets	✓		
Spare Batteries (x 2)	✓		

SENSOR CALIBRATION DETAILS

		Calibration Undertaken	Accuracy	Pass	Fail
Temperature		Factory Calibrated	±0.2°C	✓	
Dissolved Oxygen	✓	100% Saturation	±2%	✓	
		Pressure Compensation	1011 hPa	✓	
Conductivity	✓	1288mS/cm	±0.5%	✓	
	✓	Check linearity at 1.4mS/cm	±0.5%	✓	
Salinity		Auto Calibrated	±1%	✓	
pH	✓	pH 7.00	± 0.2	✓	
	✓	pH 4.00	± 0.2	✓	
ORP	✓	233 mV at 23 °C	±20mV	✓	

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Tia Cochrane

ECO Environmental Equipment Specialist

Date: 18.01.2022

ECO Environmental

Environmental monitoring
& sampling equipment
Rentals and sales.

Tel: +61 8 9328 2900
fax: +61 8 9328 2677
eco@ecoenvironmental.com.au
www.ecoenvironmental.com.au

EQUIPMENT INFORMATION

Instrument: GPP8 - Geotech Peristaltic Pump

Serial Number: C14000861

Equipment Check

	Enclosed	Returned	Comment
GeoPump Controller	✓		
Power Supply Cable	✓		
Car Battery Adapter	✓		
Carry Bag	✓		
12v portable battery	✓		
Battery charger	✓		

Inspection Details	Pass	Fail	Comment
De-con wash of unit & cable	✓		
De-con wash of battery & carry case	✓		
Inspection for faults, corrosion and damage	✓		
Unit in good working order, clean & ready for use	✓		

This is to certify that where possible this instrument has been cleaned in accordance with the manufacture's general maintenance procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

N.Bhat

Equipment Specialist
ECO Environmental

Date: 22.12.2021

TETRA TECH COFFEY

Job/site details:			
Project name:	PERRAMAN	Project Number:	
Fieldwork date(s):	10/2/22	Work completed by:	NT/CR.
Type of work (ESA, GME etc)	GME.		

Photoionisation Detector (PID)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Challenge gas standard:		Gas batch #:		Gas expiry date:	

Field challenge details:

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

Lower explosive level (LEL) meter (or multi gas meter)					
Equipment description:			Equipment serial number:		
Recommended calibration frequency:		Last calibration date:		Calibrated by:	
Challenge gas standard:		Gas batch #:		Gas expiry date:	
Field challenge details:		If recorded on hot work permit, record HWP number here:			

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

Water quality meter (WQM)					
Equipment description:	YSI WQ METER.		Equipment serial number:		YSI PPZ
Recommended calibration frequency:	DAILY	Last calibration date:	9/2/22	Calibrated by:	NT.
Calibration standards:	pH 4 & 7	Batch #:	375757/ 378281	Gas expiry date:	—

Field calibration record:

Date calibrated	DO	Conductivity	pH 4.0	pH ~~6.88~~ 7.	Temperature
10/2/22	—	BUMP TEST → 14.19mS/cm.	4.10	7.14	20.7°C.

Interface probe (IP)					
Equipment description:			Equipment serial number:		
Recommended service frequency:		Last service date:		Serviced by:	

Field challenge details:

Date	Time	Pass/Fail	Date	Time	Pass/Fail	Date	Time	Pass/Fail

TETRA TECH
CSKELT

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Ferdinand DSI

PROJECT NUMBER: 154-P2020-3453-5

FIELD PERSONNEL: S A

DATE: 21/2/23

PROJECT MANAGER: R W

PAGE 1 of 1

WELL ID: MW03 DIAMETER: 50 mm WELL DEPTH: 2.965 m SCREEN INTERVAL: m to m bgl STICK-UP: 52 cm

FIELD EQUIPMENT IDENTITIES
IP Serial number: 02-0568
WQM Serial Number:
PID Serial number:

FIELD EQUIPMENT INSTALLATION DETAILS
Depth to Water: Before Pump Installation: 0.543 m below TOC
After Pump Installation: 0.503 m below TOC
Pump Intake Depth:
Equipment Warm:
DO2 Net Electrode: Model: SHE / Serial Number: KO / Agitator Model: / Agitator Serial No:

WELL HEADSPACE PID READING
PID READING:
PPM:

TIME OF DAY	PUMP RATE (mL/min)	VOLUME (L) (min 1)	DEPTH TO WATER (m) (min 1)	DISSOLVED OXYGEN (mg/L)		ELECTRICAL CONDUCTIVITY (mS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY (NTU)	COLOUR	ODOUR	COMMENTS (Note if other equipment used)
				READING	CHANGE	READING	CHANGE	READING	CHANGE	READING	CHANGE	READING	CHANGE				
0:31	350		0.503	16.2		0.069		7.48		49.6		33.3		✓			
0:33	350		0.503	11.4		0.053		7.41		49.7		32.4		✓			
0:35	350		0.503	9.2		0.039		7.38		46.4		32.5		✓			
0:37	350		0.503	9.1		0.004		7.37		45.4		32.5		✓			
STABILISATION CRITERIA (3 readings within tolerance range)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C					

DUPLICATE COLLECTED: Y [X] N [ ] DUPLICATE ID: QC1

TRIPLICATE COLLECTED: Y [X] N [ ] TRIPLICATE ID: QC2

WERE METALS FIELD FILTERED? Y [ ] N [X] NA [ ] (unfiltered samples must not be placed in a preserved container i.e. nitric acid)

HAS THIS FORM BEEN COMPLETED IN FULL? Y [X] N [ ]

Notes:

TETRA TECH CONTEC

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME:	Pendleton DSI	PROJECT NUMBER:	704-26/00 24975
FIELD PERSONNEL:	S.J.	DATE:	21/2/22
PROJECT MANAGER:	B.W.	PAGE	1 of 1

WELL ID: MW(B) DIAMETER: 50 mm WELL DEPTH: 3.91 m SCREEN INTERVAL: m to m below TOC STICK-UP: 50 mm above TOC

FIELD EQUIPMENT IDENTIFIERS: YI Serial Number: 12C2-12568; YSI/Xylem Serial Number: ; PID Serial Number: ;

FIELD EQUIPMENT INSTALLATION DETAILS: Depth to Water: Before Pump Installation 0.359 m below TOC; After Pump Installation 0.360 m below TOC; Pump Hose Depth: ; Equipment Used: ; Other Set Equipment: Hydrolab; Other; Control Solution NO: ; Agitator NO: ; Agitator NO: ; Agitator Calibration NO:

WELL HEADSPACE PID READING: PID READING: ; PPM:

TIME (24 hr)	PURGE RATE (mL/min)	VOLUME (L)	DEPTH TO WATER (m)	DISSOLVED OXYGEN (mg/L)		ELECTRICAL CONDUCTIVITY (mS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY (NTU)	COLOUR	ODOUR	CONTROL	COMMENTS (Describe colour, odour, sediment, etc.)
				READING	CHANGE	READING	CHANGE	READING	CHANGE	READING	CHANGE	READING	CHANGE					
1337	300			29.1		195.08		6.97		56.9		31.5		X				bw turbidity, no odour
1339	"			29.1		194.85		6.97		56.4		31.5		X				"
1341	"			29.1		194.99		6.97		56.0		31.5		X				"
1343	"			29.2		194.98		6.97		56.0		32.5		X				"
STABILIZATION CRITERIA (Provided within brackets below)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C						

DUPLICATE COLLECTED: Y ☐ N ☒ Duplicate ID: TRIPLICATE COLLECTED: Y ☐ N ☒ Triplicate ID:

WERE METALS FIELD FILTERED? Y ☐ N ☒ N/A ☐ Unfiltered samples must not be put into a preserved container (i.e. nitric, HCl) HAS THIS FORM BEEN COMPLETED IN FULL? Y ☒ N ☐

Notes: [illegible]

TETRA TECH

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Rodham OST

PROJECT NUMBER: 35-1820-5351

FIELD PERSONNEL: S.A

DATE: 2/12/22

PROJECT MANAGER: B.W

PAGE: 1 of

WELL ID: BH27 **DIAMETER:** 50 mm **WELL DEPTH:** 11.905 m **SCREEN INTERVAL:** – to – m below TOC **STICK-UP:** 0.5 m

FIELD EQUIPMENT IDENTITIES

P Serial number: 02 – 0568

WQM Serial Number:

PID Serial number:

FIELD EQUIPMENT INSTALLATION DETAILS Bailer used

Depth to Water – Before Pump Installation: 0.631 m below TOC

After Pump Installation: 0.631 m below TOC

Pump Intake Depth:

Calculated Volume:

CRC Dot Electronic, model: SHI – Calibrated Saturated KCl – Aqua-Sol KCl – Aqua-Sol KCl – Aqua-Sol Saturated KCl

WELL HEADSPACE PID READING

PID READING:

PPM:

TIME OF DAY	PUMP RATE (mL/min)	VOLUME (L) Note 1	DEPTH TO WATER (m) Note 2	DISSOLVED OXYGEN (mg/L)		ELECTRICAL CONDUCTIVITY (mS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – VISUAL				COMMENTS
				Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change					
2:32	Bailer used x30 times purge			11.6		1999µS		6.62		53.1		19.5						cloudy, high turbidity, well bailed 30 times
STABILISATION CRITERIA (3 readings within ranges below)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C						

DUPLICATE COLLECTED: Y [ ] N [X] DUPLICATE ID:

TRIPLICATE COLLECTED: Y [ ] N [X] TRIPLICATE ID:

WERE METALS FIELD FILTERED? Y [ ] N [X] NA [ ] (unfiltered samples must not be put into a preserved container (i.e. metals bottle)) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y [X] N [ ]

Notes: 1 Empty tubing volume if equipment is disassembled between locations, 2 Depth to water measurement, 3 Groundwater quality parameters to be handled in accordance with project plan

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Page 1 of 1

TETRA TECH COFFEY

Corresponding Office: Tetra Tech Coffey
Report Results to: Bernie Weekes
Invoices to: accounts.perth@tetratech.com
Mobile: 0407817762
Phone:
Email: bernie.weekes@coffey.com
Email:
Project No: 75U-PERGN295751
Project Name: Perdaman PS I
Sampler's Name: Sanjana Audit
Quote number (if different to current quoted prices):
Special Instructions:
Task No:
Laboratory: ALS
Project Manager: Bernie Weekes

Analysis Request Section

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil, etc)	Container Type & Preservative*	T.A.T. (Specify)	Intralab triplicate, please send to ALS											NOTES
	MW03	21/2/22	AM	Water	Various	3-days												Analysis to be emailed by Bernie Weekes
	MW02	"	"	"	↓	"												
	BH27	"	"	"		"												
	QC1	"	"	"		"												
	QC2	"	"	"		"	✓											
	QC3	"	"	"		"												
	QC4	"	"	"		"												
	TBW166	"	"	"	1 vial	"												
	MW09	"	"	"	Various	"												

RELINQUISHED BY		RECEIVED BY	
Name: Sanjana Audit	Date: 21/2/22 →	Name:	Date:
Coffey:	Time:	Company:	Time:
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)
All Samples Received in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab Ref/Batch No:

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock Bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Pedmouth OSE

PROJECT NUMBER: 756 P6260/39575

FIELD PERSONNEL: SA

DATE: 21/3/22

PROJECT MANAGER: R.W.

PAGE: 1 of

WELL ID: MW09 DIAMETER: 50 mm WELL DEPTH: m SCREEN INTERVAL: m m from TOC STICK-UP: m

FIELD EQUIPMENT IDENTITIES
PI Serial Number: 02-0568
MDM Serial Number:
PID Serial Number:

FIELD EQUIPMENT INSTALLATION DETAILS: Bailer used
Depth to Water: Before Pump Installation: 0.593 m from TOC
After Pump Installation: 0.591 m from TOC
Pump Intake Depth:
Equipment Notes:

WELL HEADSPACE PID READING
PID READING:
ppm

DEP ON EXISTING (circle) Site / Cabinet Submitted (circ) / AGN01 IN KO / AGN01 IN KO / AGN01 Submitted (circ)

Time of Day	Pump Flow Rate (mL/min)	Volume (L max.)	Cumulative Volume (L max.)	Dissolved Oxygen mg/L %		Electrical Conductivity mS/cm		pH pH Units		Redox Potential (mV)		Temperature °C		Clarity (NTU)	Colour	Odour	Comments
				Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change				
14:00	Bailer used X10 min purged			8.9		41300		7.09		39.4		29.8				X	dark, moderate odour
STABILISATION CRITERIA (Consecutive readings taken)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C					

DUPLICATE COLLECTED: Y ☐ N ☒ DUPLICATE ID: TRIPLICATE COLLECTED: Y ☐ N ☒ TRIPLICATE ID:

WERE METALS FIELD FILTERED? Y ☐ N ☒ NA ☐ (filtered samples must not be put into a preserved container (i.e. nitric bottle)) HAS THIS FORM BEEN COMPLETED IN FULL? Y ☒ N ☐

Name: Date: Signature:
Name: Date: Signature:

TETRA TECH COFFEY

Well Gauging Form

PROJECT NAME:	Perdaman 051	PROJECT NUMBER:	754- PERDN 295751
FIELD PERSONNEL:	S.A.	DATE:	21/02/22
PROJECT MANAGER:	B.W.	PAGE:	1 of 1

FIELD EQUIPMENT:

Equipment Used: IP - HOIL / SMOIL IP Serial Number: ~~IE~~ 02-0568

Time of Day	Well ID	Well Diameter	Total Well Depth note 1	Depth to PSH (NAPL) (A)	Depth to Groundwater (B)	PSH Thickness (B-A)	Height of Well Stick-Up	COMMENTS (notes 2 & 3) ODOUR, COLOUR, SHEEN, NAPL (and its colour), REMEDIATION SYSTEM, etc.
		mm	m	mBTOC	mBTOC	mm	m	
11:33	BH27	50	10.845	N/A	0.631	N/A	0.5	cloudy, high turbidity, no odour
11:43	MW02	"	3.271	N/A	0.758	N/A	0.5	clear, colourless, no odour
11:52	MW03	"	2.965	N/A	0.543	N/A	0.5	clear colourless, no odour
16:00	MW09	"	3.88	N/A	0.621	N/A	0.50	~~slightly~~ moderately cloudy, no odour
Note Fill								

Notes: 1 Indicate in 'Comments' column if measured Total Well Depth differs from log. 2 Do not attempt to sniff the monitoring well to detect any odours, only note any apparent odour when the well cap is opened.
3 If no site map / field sketch or detailed survey information is available for each well, please provide a description of the well location and or hand held GPS co-ordinates to positively identify the well.

coffey

Well Gauging Form

PROJECT NAME: Perdaman

PROJECT NUMBER: 754-PEREN29 5751

FIELD PERSONNEL: Nick Taylor + Charlie Rolfe

DATE: 8/02/22

PROJECT MANAGER: Bernie Weakes

FIELD EQUIPMENT:

Equipment Used: IP

IP Serial Number:

REFER TO SOPs WHEN GAUGING WELLS:

SOP - Monitoring Well Gauging and SOP – Decontamination of Sampling Equipment

Time of Day	Well ID	Well Diameter	Total Well Depth **note 1**	Depth to PSH (NAPL) [A]	Depth to Groundwater [B]	PSH Thickness [B-A]	Height of Well Stick-Up	COMMENTS (**notes 2 & 3**) ODOUR, COLOUR, SHEEN, NAPL (and its colour), REMEDIATION SYSTEM, etc
		mm	m	mBTOC	mBTOC	mm	m	
14:15	BH22	50	12.240	-	10.955	-	0.69	
14:30	MW10	50	2.37	-	1.01	-		
14:40	MW03	50	2.97	-	0.55	-	0.46	
14:42	BH12	50	11.78	-	1.145	-	0.77	
14:52	MW02	50	3.27	-	0.815	-	0.60	
	~~MW04~~							
14:57	BH27	50	10.82	-	0.86	-		
15:04	MW09	50	3.88	-	0.41	-	0.43	
15:09	MW01	50	10.04	-	7.84	-		
15:20	MW07	50	1.95	-	0.915	-	0.92	
15:22	MW08	50	1.70	-	1.13	-	0.98	
15:32	MW06	50	12.15	-	6.505	-	0.91	
15:37	BH31	50	0.52	-	8.37	-	0.52	
15:40	MW04	50	0.62	-	21.61	-	0.62	
15:45	MW05	50	0.84	-	7.625	-	0.84	

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman
PROJECT NUMBER: 754-PEREM 295751
FIELD PERSONNEL: NT + CR
DATE: 10/2/22
PROJECT MANAGER: DW

WELL ID: MW05 **DIAMETER:** _____ mm **WELL DEPTH:** 19.2 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.84 mm

FIELD EQUIPMENT
Equipment ID: _____
WQ Meter ID: _____
WQ Meter Type: _____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: _____ m below TOC
After Pump Installation: _____ m below TOC
Pump Intake Depth: _____
Equipment Volume: _____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
11:14			7.62	76.1		5718		6.79		-80.8		30.0		✓					
11:17			7.86	69.1		5490		5.91		-91.2		29.0							
11:20			7.98	31.5		5327		6.76		-107.4		29.1							
11:23			8.12	36.8		5206		6.79		-112.4		29.4							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____
WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman

PROJECT NUMBER: 754-PEREN295751

FIELD PERSONNEL: NT + CR

DATE: 10/02/22

PROJECT MANAGER: BW

WELL ID: MW04 **DIAMETER:** _____ mm **WELL DEPTH:** 0.62 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.62 ~~mm~~ m

FIELD EQUIPMENT

Equipment ID: _____

WQ Meter ID: _____

WQ Meter Type: _____

FIELD EQUIPMENT

Depth to Water - Before Pump Installation: _____ m below TOC

After Pump Installation: _____ m below TOC

Pump Intake Depth: _____

Equipment Volume: _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
			21.59																
				Insufficient Sample															
STABILISATION CRITERIA (3 readings within following ranges)				**± 10%**		**± 3%**		**± 0.1 unit**		**± 10mV**		**± 0.2°C**							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____

TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell + tubing
2 Drawdown during pumping to be limited to <100 mm where possible

coffey

Total depth: 2.37

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman

PROJECT NUMBER: 754-PEREN295751

FIELD PERSONNEL: Nick Taylor + Charlie Rolfe

DATE: 9/02/22

PROJECT MANAGER: Bernie Weakes

WELL ID: MW10 **DIAMETER:** 50 mm **WELL DEPTH:** 2.37 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** _____ mm

FIELD EQUIPMENT

Equipment ID: _____

WQ Meter ID: _____

WQ Meter Type: _____

FIELD EQUIPMENT

Depth to Water - Before Pump Installation: _____ m below TOC

After Pump Installation: _____ m below TOC

Pump Intake Depth: _____

Equipment Volume: _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
6:40	350		1.01	5.4		7599		7.22		70.6		30.7		✓					
6:43	350		1.025	30.8		7635		7.73		62.9		31.4							
6:46	350		1.025	22.1		7858		7.78		63.6		31.4							
6:49	350		1.03	18.2		8396		7.77		66.6		31.4							
6:52	350		1.03	17.1		8607		7.76		67.8		31.4							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☑ N ☐ DUPLICATE ID: QC01

TRIPLICATE COLLECTED: Y ☑ N ☐ TRIPLICATE ID: QC02

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman
PROJECT NUMBER: 754-PEREN295751
FIELD PERSONNEL: Nick Taylor + Charlie Rolfe
DATE: 9/02/22
PROJECT MANAGER: Bernie Weakes

WELL ID: BH12 **DIAMETER:** 50 mm **WELL DEPTH:** 11.78 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.77 m

FIELD EQUIPMENT
Equipment ID: _____
WQ Meter ID: _____
WQ Meter Type: _____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: _____ m below TOC
After Pump Installation: _____ m below TOC
Pump Intake Depth: _____
Equipment Volume: _____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
~~7:41~~			~~1.155~~	~~105.3~~		~~103253~~		~~6.87~~		~~-100.4~~		~~30.8~~							
~~7:44~~																			
7:51	350		1.28	2.5		124886		7.04		-141.6		31.0		✓					No odour
7:53	350		1.355	3.5		134096		6.99		-133.9		30.8							
7:56	350		1.401	2.1		148815		6.92		-117.8		30.4							
7:59	350		1.401	2.5		154930		6.92		-115.1		30.3							
8:02	350		1.415	2.9		160556		6.90		-115.3		30.1							
8:05	350		1.415	2.7		164862		6.87		-111.8		29.9							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

* Inlet to low flow cell leaking

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman
PROJECT NUMBER: 754-PERENZ95751
FIELD PERSONNEL: NT+CR
DATE: 9/02/22
PROJECT MANAGER: Bernie Weakes

WELL ID: MW02 **DIAMETER:** 50 mm **WELL DEPTH:** 3.27 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.6 m ~~mm~~

FIELD EQUIPMENT
Equipment ID: _____
WQ Meter ID: _____
WQ Meter Type: _____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: _____ m below TOC
After Pump Installation: _____ m below TOC
Pump Intake Depth: _____
Equipment Volume: _____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l) * See Note		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
9:24			0.805	107.0		177352		6.56		201.7		32.3		✓					NO ODOUR
9:27			0.835	91.2		177345		7.01		171.4		32.3							
9:30			0.835	80.6		177021		7.03		151.0		32.3							
9:33			0.84	65.7		176888		7.04		137.0		32.2							
9:36			0.84	83.1		176588		7.04		128.2		32.2							
9:39			0.84	97.2		176677		7.04		121.4		32.1							
9:42			0.84	77.1		176602		7.05		115.7		32.2							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

* Inlet to Flow through cell leaking

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman
PROJECT NUMBER: 754- PEREN 245751
FIELD PERSONNEL: NT + CR
DATE: 9/02/22
PROJECT MANAGER: Bernie Weakes

WELL ID: MW03 **DIAMETER:** 50 mm **WELL DEPTH:** 2.97 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.46 m

FIELD EQUIPMENT
Equipment ID: _____
WQ Meter ID: _____
WQ Meter Type: _____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: _____ m below TOC
After Pump Installation: _____ m below TOC
Pump Intake Depth: _____
Equipment Volume: _____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l) * See Note		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
8:40			0.545	54		120774		6.66		188.7		30.4		✓					
8:43			0.565	38.9		120610		7.76		127.8		30.1							
8:46			0.565	26.6		120169		7.68		116.0		30.2							
8:49			0.565	18.2		119977		7.60		106.0		30.1							
8:52			0.565	16.2		119931		7.56		98.1		30.1							
8:55			0.565	13.2		119910		7.51		94.1		30.2							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

2* ~~outlet~~ inlet to flow through cell leaking.

coffey

Groundwater Sampling Form (A) General

micropurge

1* Bottom indistinct may be silty

PROJECT NAME: Pendoman **PROJECT NUMBER:** 754-PERENZ95751

FIELD PERSONNEL: NT + CR **DATE:** 9/2/22

PROJECT MANAGER: Bernie Weakes

WELL ID: MBH27 **METER ID& TYPE :** **TOTAL WELL DEPTH:** 10.82 *1 **SCREEN INTERVAL:**

EQUIPMENT USED: BAILER ☐ **WATERRA** ☐ **OTHER** **WELL DIAMETER:** **WELL STICK-UP:**

WELL GAUGING AND PURGE VOLUME CALCULATIONS

(TOTAL WELL DEPTH) – (DEPTH TO WATER) = (WATER COLUMN)

_____m - _____ = _____m

Use water column calculation together with the procedures in 'SOP- Groundwater Sampling - Bailers' to determine the correct volume to be purged from the well (enter this value in the field to the right)

LITRES PER 1 WELL VOLUME

_____L

WELL HEADSPACE PID READING

PID READING

PPM: _____

ORP REFERENCE ELECTRODE: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L)	DEPTH TO WATER (m)	DISSOLVED OXYGEN (mg/l) *2		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
10:12			0.87	90.7		182204		6.31		170.1		32.0							
10:15			1.07	93.2		183728		6.72		71.2		30.9							
10:19			1.05	89.7		185560		6.76		105.6		30.1							
10:22			1.05	66.8		186936		6.77		88.3		29.9							
10:25			1.05	93.2		188560		6.77		78.5		29.6							
10:28			1.05	95.2		189899		6.78		71.1		29.4							
10:31			1.05	94.2		189810		6.77		67.5		29.3							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____ **TRIPLICATE COLLECTED:** Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

* Not enough water for all samples - PFAS - MNA
well purged dry almost.

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman **PROJECT NUMBER:** 754-PEREN

FIELD PERSONNEL: NT + CR **DATE:** 9/02/22

PROJECT MANAGER: BW

WELL ID: MW07 **DIAMETER:** _____ mm **WELL DEPTH:** 1.95 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.92 m ~~mm~~

FIELD EQUIPMENT

Equipment ID: _____

WQ Meter ID: _____

WQ Meter Type: _____

FIELD EQUIPMENT

Depth to Water - Before Pump Installation: _____ m below TOC Pump Intake Depth: _____

After Pump Installation: _____ m below TOC Equipment Volume: _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
12:08			0.92	12.7		188619		7.01		186.1		30.6							
12:11			1.75	29.3		189685		7.08		167.6		31.0							
12:14																			
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____ **TRIPLICATE COLLECTED:** Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☐ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes: 1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm w.c.

* Reduced flow significantly to ~ 50ml/min, however bore ran dry collected - metals - PFAS - MDEA

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman

PROJECT NUMBER: 754-PEREN295751

FIELD PERSONNEL: NT + CR

DATE: 10/2/22

PROJECT MANAGER: BW

WELL ID: MW07 **DIAMETER:** _____ mm **WELL DEPTH:** ~~0.91~~ 1.95 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** _____ mm

FIELD EQUIPMENT

Equipment ID: _____

WQ Meter ID: _____

WQ Meter Type: _____

FIELD EQUIPMENT

Depth to Water - Before Pump Installation: _____ m below TOC

After Pump Installation: _____ m below TOC

Pump Intake Depth: _____

Equipment Volume: _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
7:27			0.91	94.4		185223		6.77		280		28.8		✓					
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____

TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes: 1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <10%

coffey

* inlet to flow through cell broken

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman
PROJECT NUMBER: 754 - PEREN295751
FIELD PERSONNEL: NT + CR
DATE: 10/2/22
PROJECT MANAGER: BW

WELL ID: MW06 **DIAMETER:** 50 mm **WELL DEPTH:** 12.15 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.91 m ~~mm~~

FIELD EQUIPMENT
Equipment ID: _____
WQ Meter ID: _____
WQ Meter Type: _____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: _____ m below TOC
After Pump Installation: _____ m below TOC
Pump Intake Depth: _____
Equipment Volume: _____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l) * see note		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
9:28			6.51	83.7		5475		7.03		-26.1		29.0		✓					Slightly organic odour
9:31			6.93	840		5184		6.98		-68.6		29.0							
*water level after sampling 7.525 → 0.5cm recovery in 5mins																			
* Air bubbles noticed in line																			
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes: 1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

* following bailing final water level 9.34 mbtoc
Bailer Low flow - MDEA
- PFAS (rest bailed)

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdoman
PROJECT NUMBER: 754-PERENZ95751
FIELD PERSONNEL: NT + CR
DATE: 10/2/22
PROJECT MANAGER: BW

WELL ID: BH31 **DIAMETER:** 50 mm **WELL DEPTH:** 11.67 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** 0.52 m ~~mm~~

FIELD EQUIPMENT
Equipment ID: _____
WQ Meter ID: _____
WQ Meter Type: _____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: _____ m below TOC
After Pump Installation: _____ m below TOC
Pump Intake Depth: _____
Equipment Volume: _____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
10:11			8.37	52.7		7028		7.38		-79.2		29.5				✓			Slight organic odour
10:14			8.51	51.7		7230		7.42		-99.2		29.0							
10:17			8.605	89.2		7111		7.74		-98.3		29.3							
	8.69	dry	→ bailer																
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____
WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes: 1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell tubing
2 Drawdown during pumping to be limited to <100 mm where

*insufficient water to purge

coffey

Groundwater Sampling Form (A) - General

PROJECT NAME: Perdaman **PROJECT NUMBER:** 154-PEREN

FIELD PERSONNEL: NT + CR **DATE:** 9/02/22

PROJECT MANAGER: BW

WELL ID: MW08 **METER ID& TYPE :** **TOTAL WELL DEPTH:** 1.70 **SCREEN INTERVAL:**

EQUIPMENT USED: BAILER ☑ **WATERRA** ☐ **OTHER** **WELL DIAMETER:** **WELL STICK-UP:** 0.98m

WELL GAUGING AND PURGE VOLUME CALCULATIONS

(TOTAL WELL DEPTH) – (DEPTH TO WATER) = (WATER COLUMN)

_____m - _____ = _____m

Use water column calculation together with the procedures in 'SOP- Groundwater Sampling - Bailers' to determine the correct volume to be purged from the well (enter this value in the field to the right)

LITRES PER 1 WELL VOLUME

_____L

WELL HEADSPACE PID READING

PID READING

PPM: _____

ORP REFERENCE ELECTRODE: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L)	DEPTH TO WATER (m)	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
13:16			1.14	12.1		142174		7.15		93.5		31.6							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____ **TRIPLICATE COLLECTED:** Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☐ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

coffey

Groundwater Sampling Form (B) – Micro Purge

1min 24sec

PROJECT NAME: Perda mall

PROJECT NUMBER: 754-PEREN245751

FIELD PERSONNEL: NT + CR

DATE: 10/2/22

PROJECT MANAGER: BW

WELL ID: MW08 **DIAMETER:** _____ mm **WELL DEPTH:** 1.7 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** _____ mm

FIELD EQUIPMENT

Equipment ID: _____

WQ Meter ID: _____

WQ Meter Type: _____

FIELD EQUIPMENT

Depth to Water - Before Pump Installation: _____ m below TOC

After Pump Installation: _____ m below TOC

Pump Intake Depth: _____

Equipment Volume: _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
7:50	350		1.06	96.1		148884		7.13		137.6		30.1		✓					
7:53	350		1.16	99.4		142980		7.29		126.9		29.3							
7:56	350		1.16	97.3		144574		7.20		110.2		29.1							
7:59	350		1.16	96.8		147614		7.18		102.3		29.2							
8:02	350		1.165	96.6		147087		7.16		98.3		29.2							
8:05	350		1.165	97.4		145038		7.15		93.4		29.3							
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☑ N ☐ DUPLICATE ID: QC06

TRIPLICATE COLLECTED: Y ☑ N ☐ TRIPLICATE ID: QC07

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes: 1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

* Significant drawdown in well to 8.6m ∴ took sample without equilibration due to low permeability - Air noted in sample.

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman
PROJECT NUMBER: 754-PEREN295751
FIELD PERSONNEL: NT + CR
DATE: 9/02/22
PROJECT MANAGER: BW

WELL ID: MW01 **DIAMETER:** _____ mm **WELL DEPTH:** 10.04 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** _____ mm

FIELD EQUIPMENT
Equipment ID: _____
WQ Meter ID: _____
WQ Meter Type: _____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: _____ m below TOC
After Pump Installation: _____ m below TOC
Pump Intake Depth: _____
Equipment Volume: _____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
15:38			7.83	5.9		9782		6.63		-178.5		30.0		✓					
15:41			8.09	5.0		9070		6.56		-169.2		28.7							
15:44			8.19																
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: _____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

* Insufficient water to purge → used bailer

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman
PROJECT NUMBER: 754-PEREN295751
FIELD PERSONNEL: NT + CR
DATE: 9/02/22
PROJECT MANAGER: BW

WELL ID: BH22 **DIAMETER:** ____ mm **WELL DEPTH:** 12.240 m **SCREEN INTERVAL:** ____ to ____ m below TOC **STICK-UP:** 0.64 m

FIELD EQUIPMENT
Equipment ID: ____
WQ Meter ID: ____
WQ Meter Type: ____

FIELD EQUIPMENT
Depth to Water - Before Pump Installation: ____ m below TOC
After Pump Installation: ____ m below TOC
Pump Intake Depth: ____
Equipment Volume: ____
ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING
PID READING
PPM: ____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
14:44			10.955	0.3		7469		7.21		-116.4		29.6							Black
																			Organic odour
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: ____
TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: ____

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

Notes: 1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

coffey

Groundwater Sampling Form (A) - General

PROJECT NAME: Pecdaman **PROJECT NUMBER:** 754-PEREN 295751

FIELD PERSONNEL: NT + CR **DATE:** 9/02/22

PROJECT MANAGER: BW

WELL ID: MW039 **METER ID& TYPE :** **TOTAL WELL DEPTH:** 3.88 **SCREEN INTERVAL:**

EQUIPMENT USED: BAILER ☑ **WATERRA** ☐ **OTHER** **WELL DIAMETER:** 50 **WELL STICK-UP:** 0.43

WELL GAUGING AND PURGE VOLUME CALCULATIONS

(TOTAL WELL DEPTH) – (DEPTH TO WATER) = (WATER COLUMN)

3.88 m - 0.44 = 3.44 m

Use water column calculation together with the procedures in 'SOP- Groundwater Sampling - Bailers' to determine the correct volume to be purged from the well (enter this value in the field to the right)

LITRES PER 1 WELL VOLUME 6 L 30L Purged

WELL HEADSPACE PID READING

PID READING

PPM:

ORP REFERENCE ELECTRODE: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

$\pi \times 0.025^2$ - 0.002 × water col

0.006

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L)	DEPTH TO WATER (m)	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
11:30	–		0.44	20.3		14166 2		6.84		77.2		29.5					✓		Pale brown
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☑ DUPLICATE ID: **TRIPLICATE COLLECTED:** Y ☐ N ☑ TRIPLICATE ID:

WERE METALS FIELD FILTERED? Y ☑ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☑ N ☐

* unable to sample

coffey

Groundwater Sampling Form (B) – Micro Purge

PROJECT NAME: Perdaman

PROJECT NUMBER: 754-PERENZ95751

FIELD PERSONNEL: CR + NT

DATE: 9/02/22 + 10/02/22

PROJECT MANAGER: BW

WELL ID: MW09 **DIAMETER:** _____ mm **WELL DEPTH:** 3.88 m **SCREEN INTERVAL:** _____ to _____ m below TOC **STICK-UP:** _____ mm

FIELD EQUIPMENT

Equipment ID: _____

WQ Meter ID: _____

WQ Meter Type: _____

FIELD EQUIPMENT

Depth to Water - Before Pump Installation: _____ m below TOC

After Pump Installation: _____ m below TOC

Pump Intake Depth: _____

Equipment Volume: _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L) note 1	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
			0.445																
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☐ DUPLICATE ID: _____

TRIPLICATE COLLECTED: Y ☐ N ☐ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☐ N ☐ Unfiltered samples **must not** be put into a preserved container (i.e. 'metals' bottle) **HAS THIS FORM BEEN COMPLETED IN FULL?** Y ☐ N ☐

Notes:
1 Ensure minimum 3 'equipment' volumes including volume of pump bladder, flow cell and tubing
2 Drawdown during pumping to be limited to <100 mm where possible

TETRA TECH COFFEY

Project No.	TS4-PEREN295751
Date:	9/02/22
Page	1 of

FIELD QUALITY CONTROL LOG

Project Name: Perdaman

Field Personnel (Initials): NT+CLR

Project Manager (Initials): BW

Field QC Sample ID	Sampling Date/ Time	QC Type	QC Primary Sample (If applicable)	Sample Matrix	Details of laboratory supplied UHP water (if used)	
					Batch No.	Grade
QC01	9/02/22	Duplicate	MW10	Water		
QC02	9/02/22	Triplicate	MW10	Water		
QC03	9/02/22	FIELD BLANK		WATER		
QC04	9/02/22	SOCK ~~BLANK~~ RINSATE		WATER		
QC05	9/02/22	RINSATE		WATER		
TBW46	18/1/22 2pm	TRIP BLANK		WATER		
QC06	10/2/22	Duplicate	MW08	Water		
QC07	10/2/22	Triplicate	MW08	Water		
QC08	10/2/22	Field blank		Water		
QC09	10/2/22	Rinsate		Water		

UHP grades: V- VOC, S-SVOC, M, metals and inorganics.

APPENDIX D: LABORATORY CERTIFICATES

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Page ____ of _____

TETRA TECH COFFEY

Consigning Office: Perth

Report Results to: Bernie Weekes — Mobile: 0407 817 762 — Email: bernie.weekes@coffey.com

Invoices to: Tetra Tech Coffey (Perth) — Phone: — Email:

Project No: PEREN295751 — Task No:

Project Name: Perdaman — Laboratory: ALS

Sampler's Name: Nick Taylor — Project Manager: Bernie Weekes

Quote number (if different to current quoted prices):

Special Instructions: firm 3 day tat required on all samples All metals samples were field filtered. Super ultra trace PFAS - long suite required (<0.00023 ug/L - LOR), General acid sulfate soil groundwater suite (Cl, SO4, Alk, Acidity, pH, EC, TDS, Dissolved Ca, Mg, Na, K, Fe, Mn, Al, by ICP-AES or MS), Anzecc heavy metals suite,

Analysis Request Section

ALS Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	ASS general groundwater suite (see comments)	7 metals (As, Cd, Cr, Cu, Pb, Ni, Zn) + low level mercury (freshwater ANZECC 95%)	PFAS long suite (0.0002 - 0.002 ug/L)	Ethanolamine, Dieethanolamine, Methyl Diethanolamine (MDEA) (LC/MS-MS)	TN, TKN, NOx, NO2, NO3, NH3), TP - standard detection	TRH/BTEXN/PAH (standard detection levels)					NOTES
	QC07	2/10/2022		Water		3-5 day	X	X	X	X	X	X					
	QC02	2/09/2022		Water		3-5 day	X	X	X	X	X	X					

RELINQUISHED BY

Name: Bernie Weekes — Date: 16/2/22
Coffey — Time:

Name: — Date: →
Company: — Time:

RECEIVED BY

Name: Rob Johnston — Date: 16/2/22
Company: Eurofins — Time: 11:06

Name: — Date:
Company: — Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

Date/Time: 16/2/22 11:06
Yes / No
17.2
16.9
15.8
0.0
16.6°C

#863798

Robert Johnston

From: Weekes, Bernie <BERNIE.WEEKES@coffey.com>
Sent: Wednesday, 16 February 2022 11:06
To: Robert Johnston; Taylor, Nick1
Cc: Hannah, Katie
Subject: RE: Perdaman and Nickol Bay samples received without a COC
Attachments: PEREN295751_SAR_Chain of Custody_GME_Eurofins_16022022.xlsx

Follow Up Flag: Follow up
Flag Status: Flagged

> **CAUTION:** EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins. Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Hi Rob,
See attached.
Regarding Nickol Bay I will let Katie respond accordingly.
Cheers

Bernie Weekes, GradCertProjMgt, BSc (EnvMgt)/BBus | Principal Environmental Consultant
Mobile **+61 407 817 762** Business **+61 8 6218 2161** | bernie.weekes@tetratech.com

From: Robert Johnston <RobertJohnston@eurofins.com>
Sent: Wednesday, February 16, 2022 10:39 AM
To: Weekes, Bernie <BERNIE.WEEKES@coffey.com>; Taylor, Nick1 <Nick.Taylor@coffey.com>
Subject: Perdaman and Nickol Bay samples received without a COC

⚠ **CAUTION:** This email originated from an external sender. Verify the source before opening links or attachments. ⚠

Hi Bernie and Nick,

Hope you are both well.

We have received QC02 for Nickol Bay and QC02 and QC07 for Perdaman. Can you please send through a COC(s) for these?

Kind Regards,

Robert Johnston
Projects Lead, WA

Eurofins ARL Pty Ltd
46-48 Banksia Road
WELSHPOOL WA 6106
Australia

Phone: +61 (0)8 6253 4444
Mobile: +61 (0)4 2357 9286

#863798

Rob Johnston 16/2/22 Eurofins

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Page ____ of _____

TETRA TECH COFFEY

Consigning Office: Perth

Report Results to: Bernie Weekes — Mobile: 0407 817 762 — Email: bernie.weekes@coffey.com

Invoices to: Tetra Tech Coffey (Perth) — Phone: — Email:

Project No: PEREN295751 — Task No:

Project Name: Perdaman — Laboratory: ALS

Sampler's Name: Nick Taylor — Project Manager: Bernie Weekes

Quote number (if different to current quoted prices):

Special Instructions: firm 3 day tat required on all samples All metals samples were field filtered. Super ultra trace PFAS - long suite required (<0.00023 ug/L - LOR), General acid sulfate soil groundwater suite (Cl, SO4, Alk, Acidity, pH, EC, TDS, Dissolved Ca, Mg, Na, K, Fe, Mn, Al, by ICP-AES or MS), Anzecc heavy metals suite,

Analysis Request Section

ALS Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	ASS general groundwater suite (see comments)	7 metals (As, Cd, Cr, Cu, Pb, Ni, Zn) + low level mercury (freshwater ANZECC 95%)	PFAS long suite (0.0002 - 0.002 ug/L)	Ethanolamine, Dieethanolamine, Methyl Diethanolamine (MDEA) (LC/MS-MS)	TN, TKN, NOx, NO2, NO3, NH3), TP - standard detection	TRH/BTEXN/PAH (standard detection levels)					NOTES
	QC07	2/10/2022		Water		3-5 day	X	X	X	X	X	X					
	QC02	2/09/2022		Water		3-5 day	X	X	X	X	X	X					

RELINQUISHED BY

Name: Bernie Weekes — Date: 16/2/22
Coffey — Time:

Name: — Date: →
Company: — Time:

RECEIVED BY

Name: Rob Johnston — Date: 16/2/22
Company: Eurofins — Time: 11:06

Name: — Date:
Company: — Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐
All Documentation is in Proper Order ☐
Samples Received Properly Chilled ☐
Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

Date/Time: 16/2/22 11:06
Yes / No
17.2
16.9
15.8
0.0
16.6°C

#863798

Robert Johnston

From: Weekes, Bernie <BERNIE.WEEKES@coffey.com>
Sent: Wednesday, 16 February 2022 11:06
To: Robert Johnston; Taylor, Nick1
Cc: Hannah, Katie
Subject: RE: Perdaman and Nickol Bay samples received without a COC
Attachments: PEREN295751_SAR_Chain of Custody_GME_Eurofins_16022022.xlsx

Follow Up Flag: Follow up
Flag Status: Flagged

> **CAUTION:** EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins. Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Hi Rob,
See attached.
Regarding Nickol Bay I will let Katie respond accordingly.
Cheers

Bernie Weekes, GradCertProjMgt, BSc (EnvMgt)/BBus | Principal Environmental Consultant
Mobile **+61 407 817 762** Business **+61 8 6218 2161** | bernie.weekes@tetratech.com

From: Robert Johnston <RobertJohnston@eurofins.com>
Sent: Wednesday, February 16, 2022 10:39 AM
To: Weekes, Bernie <BERNIE.WEEKES@coffey.com>; Taylor, Nick1 <Nick.Taylor@coffey.com>
Subject: Perdaman and Nickol Bay samples received without a COC

⚠ **CAUTION:** This email originated from an external sender. Verify the source before opening links or attachments. ⚠

Hi Bernie and Nick,

Hope you are both well.

We have received QC02 for Nickol Bay and QC02 and QC07 for Perdaman. Can you please send through a COC(s) for these?

Kind Regards,

Robert Johnston
Projects Lead, WA

Eurofins ARL Pty Ltd
46-48 Banksia Road
WELSHPOOL WA 6106
Australia

Phone: +61 (0)8 6253 4444
Mobile: +61 (0)4 2357 9286

#863798

Rob Johnston 16/2/22 Eurofins

eurofins | ARL

Certificate of Analysis

Tetra Tech Coffey Pty Ltd
Bishops See Level 1, 235 St Georges Terrace
Perth
WA 6000

NATA Accredited
Accreditation Number 2377
Site Number 2370

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Bernie Weekes**

Report **863798-W**
Project name Perdaman
Project ID PEREN295751
Received Date Feb 16, 2022

Client Sample ID			**QC07**	**QC02**
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**L22-Fe30963**	**L22-Fe30964**
Date Sampled			**Feb 10, 2022**	**Feb 09, 2022**
Test/Reference	LOR	Unit		
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	0.07	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	0.1
BTEX				
Benzene	0.001	mg/L	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	124	128
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	0.05
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02
Diethanolamine (DEA)*	0.5	mg/L	< 1	< 1
Methyldiethanolamine (MDEA)*	50	ug/L	< 50	< 50
Monoethanolamine (MEA)*	0.5	mg/L	< 1	< 1
Acidity (as CaCO3)	10	mg/L	50	< 10
Ammonia (as N)	0.01	mg/L	1.3	< 0.01
Chloride	1	mg/L	61000	2600
Conductivity (at 25°C)	10	uS/cm	140000	8800
pH (at 25 °C)	0.1	pH Units	7.5	8.3
Phosphate total (as P)	0.01	mg/L	< 0.01	< 0.01
Phosphorus filterable reactive (as P)	0.01	mg/L	0.08	0.02
Sulphate (as S)	5	mg/L	2700	120
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	130000	4700
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2	2.2
Total Nitrogen (as N)*	0.2	mg/L	6.1	11.1

Client Sample ID			QC07	QC02
Sample Matrix			Water	Water
Eurofins Sample No.			L22-Fe30963	L22-Fe30964
Date Sampled			Feb 10, 2022	Feb 09, 2022
Test/Reference	LOR	Unit		
Polycyclic Aromatic Hydrocarbons				
Benzo(a)pyrene TEQ (lower bound) *	0.001	mg/L	< 0.001	< 0.001
Benzo(a)pyrene TEQ (medium bound) *	0.001	mg/L	0.001	0.001
Acenaphthene	0.001	mg/L	< 0.001	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001	< 0.001
Anthracene	0.001	mg/L	< 0.001	< 0.001
Benz(a)anthracene	0.001	mg/L	< 0.001	< 0.001
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.001
Benzo(b&j)fluoranthene[N07]	0.001	mg/L	< 0.001	< 0.001
Benzo(g.h.i)perylene	0.001	mg/L	< 0.001	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	< 0.001	< 0.001
Chrysene	0.001	mg/L	< 0.001	< 0.001
Dibenz(a.h)anthracene	0.001	mg/L	< 0.001	< 0.001
Fluoranthene	0.001	mg/L	< 0.001	< 0.001
Fluorene	0.001	mg/L	< 0.001	< 0.001
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001	< 0.001
Naphthalene	0.001	mg/L	< 0.001	< 0.001
Phenanthrene	0.001	mg/L	< 0.001	< 0.001
Pyrene	0.001	mg/L	< 0.001	< 0.001
Total PAH*	0.001	mg/L	< 0.001	< 0.001
2-Fluorobiphenyl (surr.)	1	%	61	60
p-Terphenyl-d14 (surr.)	1	%	78	77
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
TRH >C10-C16	0.05	mg/L	< 0.05	0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1
Alkalinity (speciated)				
Total Alkalinity (as CaCO3)	20	mg/L	130	370
Eurofins Suite B19B: NO3/NO2/NOx				
Nitrate & Nitrite (as N)	0.05	mg/L	6.1	8.9
Nitrate (as N)	0.02	mg/L	6.1	8.9
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02
Heavy Metals				
Aluminium	0.05	mg/L	< 5	< 0.05
Aluminium (filtered)	0.05	mg/L	< 2.5	< 0.05
Arsenic	0.001	mg/L	0.003	< 0.001
Arsenic (filtered)	0.001	mg/L	< 0.05	< 0.001
Cadmium	0.0002	mg/L	0.0004	< 0.0002
Cadmium (filtered)	0.0002	mg/L	< 0.01	< 0.0002
Chromium	0.001	mg/L	0.002	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.05	< 0.001
Copper	0.001	mg/L	0.003	< 0.001
Iron	0.05	mg/L	< 5	< 0.05
Iron (filtered)	0.05	mg/L	< 2.5	< 0.05
Lead	0.001	mg/L	< 0.001	< 0.001
Manganese (filtered)	0.005	mg/L	< 0.25	< 0.005
Mercury (low-level)	0.00001	mg/L	< 0.0001	< 0.00001
Nickel	0.001	mg/L	0.009	< 0.001
Nickel (filtered)	0.001	mg/L	< 0.05	< 0.001

Client Sample ID			QC07	QC02
Sample Matrix			Water	Water
Eurofins Sample No.			L22-Fe30963	L22-Fe30964
Date Sampled			Feb 10, 2022	Feb 09, 2022
Test/Reference	LOR	Unit		
Heavy Metals				
Selenium (filtered)	0.001	mg/L	< 0.05	0.002
Zinc	0.005	mg/L	< 0.005	< 0.005
Zinc (filtered)	0.005	mg/L	< 0.25	< 0.005
Alkali Metals				
Sodium	0.5	mg/L	47000	2100
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace				
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	0.07
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	0.02	0.12
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	0.08
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	0.10
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	0.06
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	80	64
13C5-PFPeA (surr.)	1	%	98	80
13C5-PFHxA (surr.)	1	%	93	132
13C4-PFHpA (surr.)	1	%	120	120
13C8-PFOA (surr.)	1	%	120	92
13C5-PFNA (surr.)	1	%	87	98
13C6-PFDA (surr.)	1	%	67	101
13C2-PFUnDA (surr.)	1	%	55	116
13C2-PFDoDA (surr.)	1	%	44	72
13C2-PFTeDA (surr.)	1	%	18	26
Perfluoroalkyl sulfonic acids (PFSAs)- Ultra Trace				
Perfluorobutanesulfonic acid (PFBS)[N11]	0.001	ug/L	< 0.001	0.003
Perfluorononanesulfonic acid (PFNS)[N15]	0.001	ug/L	< 0.001	< 0.001
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.001	ug/L	< 0.001	< 0.001
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.001	ug/L	< 0.001	< 0.001
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.001	ug/L	0.001	< 0.001
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.001	ug/L	< 0.001	< 0.001
Perfluorooctanesulfonic acid (PFOS)[N11]	0.0001	ug/L	0.0003	0.0012
Perfluorodecanesulfonic acid (PFDS)[N15]	0.001	ug/L	< 0.001	< 0.001
13C3-PFBS (surr.)	1	%	126	133
18O2-PFHxS (surr.)	1	%	92	103
13C8-PFOS (surr.)	1	%	74	114
Perfluoroalkyl sulfonamido substances- Ultra Trace				
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05

Client Sample ID			QC07	QC02
Sample Matrix			Water	Water
Eurofins Sample No.			L22-Fe30963	L22-Fe30964
Date Sampled			Feb 10, 2022	Feb 09, 2022
Test/Reference	LOR	Unit		
Perfluoroalkyl sulfonamido substances- Ultra Trace				
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	56	100
D3-N-MeFOSA (surr.)	1	%	26	92
D5-N-EtFOSA (surr.)	1	%	27	89
D7-N-MeFOSE (surr.)	1	%	28	56
D9-N-EtFOSE (surr.)	1	%	33	63
D5-N-EtFOSAA (surr.)	1	%	55	95
D3-N-MeFOSAA (surr.)	1	%	56	103
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Ultra Trace				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.001	ug/L	< 0.001	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.005	ug/L	< 0.005	< 0.005
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.001	ug/L	< 0.001	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.001	ug/L	< 0.001	< 0.001
13C2-4:2 FTSA (surr.)	1	%	73	38
13C2-6:2 FTSA (surr.)	1	%	80	157
13C2-8:2 FTSA (surr.)	1	%	38	122
13C2-10:2 FTSA (surr.)	1	%	96	184
PFASs Summations				
Sum (PFHxS + PFOS)*	0.001	ug/L	0.0013	0.0012
Sum of US EPA PFAS (PFOS + PFOA)*	0.001	ug/L	< 0.001	0.0572
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.001	ug/L	0.0013	0.0572
Sum of WA DWER PFAS (n=10)*	0.005	ug/L	0.0483	0.4442
Sum of PFASs (n=30)*	0.005	ug/L	0.0483	0.4572

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Welshpool	Feb 16, 2022	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Welshpool	Feb 16, 2022	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Welshpool	Feb 16, 2022	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	Welshpool	Feb 16, 2022	7 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Welshpool	Feb 16, 2022	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Diethanolamine (DEA)*	Brisbane	Feb 16, 2022	7 Days
- Method: LCMS_DEA			
Methyldiethanolamine (MDEA)*	Brisbane	Feb 16, 2022	0 Day
- Method:			
Monoethanolamine (MEA)*	Brisbane	Feb 16, 2022	7 Days
- Method: LCMS_MEA			
Eurofins Suite B19B: NO3/NO2/NOx			
Nitrate (as N)	Welshpool	Feb 16, 2022	2 Days
- Method: LTM-INO-4350 - Nitrite, Total Oxidised Nitrogen (NOx) and Nitrate with photometric detection			
Nitrite (as N)	Welshpool	Feb 16, 2022	2 Days
- Method: LTM-INO-4350 - Nitrite, Total Oxidised Nitrogen (NOx) and Nitrate with photometric detection			
Heavy Metals	Melbourne	Feb 18, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mercury (low-level)	Melbourne	Feb 18, 2022	28 Days
- Method: LTM-MET-3050 Mercury by Cold Vapour Atomic Absorption Analysis			
Acidity (as CaCO3)	Welshpool	Feb 16, 2022	14 Days
- Method: LTM-INO-4210 Acidity			
Ammonia (as N)	Welshpool	Feb 16, 2022	28 Days
- Method: LTM-INO-4200 Ammonia by Discrete Analyser			
Chloride	Melbourne	Feb 18, 2022	28 Days
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Conductivity (at 25°C)	Welshpool	Feb 16, 2022	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Welshpool	Feb 16, 2022	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phosphate total (as P)	Melbourne	Feb 18, 2022	28 Days
- Method: LTM-INO-4040 Phosphate by CFA			
Phosphorus filterable reactive (as P)	Melbourne	Feb 18, 2022	2 Days
- Method: APHA 4500-P Phosphate (filterable reactive)			
Sulphate (as S)	Melbourne	Feb 18, 2022	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Total Dissolved Solids Dried at 180°C ± 2°C	Melbourne	Feb 18, 2022	28 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			
Alkalinity (speciated)	Welshpool	Feb 16, 2022	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			
Acid Sulphate Metals : Metals M9 filtered	Welshpool	Feb 16, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Alkali Metals	Welshpool	Feb 16, 2022	6 Months
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Total Nitrogen Set (as N)			
Total Kjeldahl Nitrogen (as N)	Melbourne	Feb 18, 2022	28 Days

Description	Testing Site	Extracted	Holding Time
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Nitrate & Nitrite (as N)	Welshpool	Feb 16, 2022	28 Days
- Method: LTM-INO-4350 - Nitrite, Total Oxidised Nitrogen (NOx) and Nitrate with photometric detection			
Per- and Polyfluoroalkyl Substances (PFASs) - Ultra Trace			
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace	Brisbane	Feb 17, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)- Ultra Trace	Brisbane	Feb 17, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances- Ultra Trace	Brisbane	Feb 17, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) Ultra trace			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Ultra Trace	Brisbane	Feb 17, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Brisbane	Feb 17, 2022	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			

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Company Name:	Tetra Tech Coffey Pty Ltd	**Order No.:**		**Received:**	Feb 16, 2022 11:06 AM
Address:	Bishops See Level 1, 235 St Georges Terrace Perth WA 6000	**Report #:**	863798	**Due:**	Feb 23, 2022
		Phone:	08 9355 7100	**Priority:**	5 Day
		Fax:	08 9470 8601	**Contact Name:**	Bernie Weekes
Project Name:	Perdaman				
Project ID:	PEREN295751				

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Arsenic	Cadmium	Chromium	Copper	Diethanolamine (DEA)*	Lead	Mercury (low-level)	Methyldiethanolamine (MDEA)*	Monoethanolamine (MEA)*	Nickel	Zinc	ASS Groundwater Quality Suite - WA Department of Environment and	Eurofins Suite B4	Eurofins Suite B19B: NO3/NO2/NOx	Per- and Polyfluoroalkyl Substances (PFASs) - Ultra Trace
Perth Laboratory - NATA # 2377 Site # 2370																	X	X	X	
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X		X	X			X	X	X			
Sydney Laboratory - NATA # 1261 Site # 18217																				
Brisbane Laboratory - NATA # 1261 Site # 20794										X			X	X						X
Mayfield Laboratory - NATA # 1261 Site # 25079																				
External Laboratory																				
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**															
1	QC07	Feb 10, 2022		Water	L22-Fe30963	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	QC02	Feb 09, 2022		Water	L22-Fe30964	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Test Counts						2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

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QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
Method Blank							
Diethanolamine (DEA)*	mg/L	< 0.5			0.5	Pass	
Methyldiethanolamine (MDEA)*	ug/L	< 50			50	Pass	
Monoethanolamine (MEA)*	mg/L	< 0.5			0.5	Pass	
Chloride	mg/L	< 1			1	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Phosphorus filterable reactive (as P)	mg/L	< 0.01			0.01	Pass	
Sulphate (as S)	mg/L	< 5			5	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	mg/L	10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/L	< 0.001			0.001	Pass	
Acenaphthylene	mg/L	< 0.001			0.001	Pass	
Anthracene	mg/L	< 0.001			0.001	Pass	
Benz(a)anthracene	mg/L	< 0.001			0.001	Pass	
Benzo(a)pyrene	mg/L	< 0.001			0.001	Pass	
Benzo(b&j)fluoranthene	mg/L	< 0.001			0.001	Pass	
Benzo(g.h.i)perylene	mg/L	< 0.001			0.001	Pass	
Benzo(k)fluoranthene	mg/L	< 0.001			0.001	Pass	
Chrysene	mg/L	< 0.001			0.001	Pass	
Dibenz(a.h)anthracene	mg/L	< 0.001			0.001	Pass	
Fluoranthene	mg/L	< 0.001			0.001	Pass	
Fluorene	mg/L	< 0.001			0.001	Pass	
Indeno(1.2.3-cd)pyrene	mg/L	< 0.001			0.001	Pass	
Naphthalene	mg/L	< 0.001			0.001	Pass	
Phenanthrene	mg/L	< 0.001			0.001	Pass	
Pyrene	mg/L	< 0.001			0.001	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Heavy Metals							
Aluminium	mg/L	< 0.05			0.05	Pass	
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Arsenic	mg/L	< 0.001			0.001	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (low-level)	mg/L	< 0.00001			0.00001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Sodium	mg/L	< 0.5			0.5	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)- Ultra Trace							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.001			0.001	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.001			0.001	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.001			0.001	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.001			0.001	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.001			0.001	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.001			0.001	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.0001			0.0001	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.001			0.001	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances- Ultra Trace							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Ultra Trace							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.001			0.001	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.005			0.005	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.001			0.001	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.001			0.001	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	92			70-130	Pass	
TRH C10-C14	%	97			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	86			70-130	Pass	
Toluene	%	94			70-130	Pass	
Ethylbenzene	%	103			70-130	Pass	
m&p-Xylenes	%	106			70-130	Pass	
o-Xylene	%	106			70-130	Pass	
Xylenes - Total*	%	106			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	111			70-130	Pass	
TRH C6-C10	%	93			70-130	Pass	
LCS - % Recovery							
Diethanolamine (DEA)*	%	107			70-130	Pass	
Methyldiethanolamine (MDEA)*	%	113			70-130	Pass	
Chloride	%	104			70-130	Pass	
Phosphate total (as P)	%	104			70-130	Pass	
Sulphate (as S)	%	117			70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	%	119			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	99			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	117			70-130	Pass	
Acenaphthylene	%	104			70-130	Pass	
Anthracene	%	94			70-130	Pass	
Benz(a)anthracene	%	76			70-130	Pass	
Benzo(a)pyrene	%	83			70-130	Pass	
Benzo(b&j)fluoranthene	%	80			70-130	Pass	
Benzo(g.h.i)perylene	%	86			70-130	Pass	
Benzo(k)fluoranthene	%	84			70-130	Pass	
Chrysene	%	78			70-130	Pass	
Dibenz(a.h)anthracene	%	102			70-130	Pass	
Fluoranthene	%	87			70-130	Pass	
Fluorene	%	113			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	82			70-130	Pass	
Naphthalene	%	108			70-130	Pass	
Phenanthrene	%	97			70-130	Pass	
Pyrene	%	87			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	95			70-130	Pass	
LCS - % Recovery							
Heavy Metals							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Aluminium	%	104			80-120	Pass	
Aluminium (filtered)	%	101			80-120	Pass	
Arsenic	%	114			80-120	Pass	
Arsenic (filtered)	%	99			80-120	Pass	
Cadmium	%	103			80-120	Pass	
Cadmium (filtered)	%	96			80-120	Pass	
Chromium	%	115			80-120	Pass	
Chromium (filtered)	%	99			80-120	Pass	
Copper	%	108			80-120	Pass	
Iron	%	104			80-120	Pass	
Iron (filtered)	%	97			80-120	Pass	
Lead	%	84			80-120	Pass	
Manganese (filtered)	%	95			80-120	Pass	
Mercury (low-level)	%	95			80-120	Pass	
Nickel	%	103			80-120	Pass	
Nickel (filtered)	%	96			80-120	Pass	
Selenium (filtered)	%	98			80-120	Pass	
Zinc	%	113			80-120	Pass	
Zinc (filtered)	%	94			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Sodium	%	117			80-120	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace							
Perfluorobutanoic acid (PFBA)	%	104			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	107			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	114			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	93			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	90			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	92			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	99			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	103			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	112			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	70			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	126			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)- Ultra Trace							
Perfluorobutanesulfonic acid (PFBS)	%	99			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	124			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	125			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	101			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	116			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	125			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	105			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	104			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances- Ultra Trace							
Perfluorooctane sulfonamide (FOSA)	%	98			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	91			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	103			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	105			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	99			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	100			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	116			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Ultra Trace									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	114			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	100			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	126			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	91			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	L22-Fe21913	NCP	%	99			70-130	Pass	
TRH C10-C14	L22-Fe30901	NCP	%	97			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	L22-Fe21913	NCP	%	86			70-130	Pass	
Toluene	L22-Fe21913	NCP	%	96			70-130	Pass	
Ethylbenzene	L22-Fe21913	NCP	%	97			70-130	Pass	
m&p-Xylenes	L22-Fe21913	NCP	%	98			70-130	Pass	
o-Xylene	L22-Fe21913	NCP	%	98			70-130	Pass	
Xylenes - Total*	L22-Fe21913	NCP	%	98			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	L22-Fe21913	NCP	%	107			70-130	Pass	
TRH C6-C10	L22-Fe21913	NCP	%	102			70-130	Pass	
Spike - % Recovery									
				Result 1					
Diethanolamine (DEA)*	L22-Fe09367	NCP	%	81			70-130	Pass	
Ammonia (as N)	L22-Fe30963	CP	%	89			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M22-Fe34776	NCP	%	96			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	L22-Fe30901	NCP	%	96			70-130	Pass	
Spike - % Recovery									
Eurofins Suite B19B: NO3/NO2/NOx				Result 1					
Nitrate & Nitrite (as N)	L22-Fe32663	NCP	%	94			70-130	Pass	
Nitrate (as N)	L22-Fe32663	NCP	%	94			70-130	Pass	
Nitrite (as N)	L22-Fe30963	CP	%	100			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium	L22-Fe31150	NCP	%	Q05			75-125	Fail	Q05
Arsenic	M22-Fe37409	NCP	%	104			75-125	Pass	
Cadmium	M22-Fe37409	NCP	%	103			75-125	Pass	
Chromium	M22-Fe37409	NCP	%	109			75-125	Pass	
Copper	M22-Fe37409	NCP	%	105			75-125	Pass	
Iron	L22-Fe31150	NCP	%	Q05			75-125	Fail	Q05
Lead	M22-Fe37409	NCP	%	93			75-125	Pass	
Nickel	M22-Fe37409	NCP	%	103			75-125	Pass	
Zinc	M22-Fe37409	NCP	%	107			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Sodium	L22-Fe31150	NCP	%	111			75-125	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace				Result 1					
Perfluorobutanoic acid (PFBA)	B22-Fe26131	NCP	%	104			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	B22-Fe26131	NCP	%	95			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorohexanoic acid (PFHxA)	B22-Fe43697	NCP	%	102			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	B22-Fe43697	NCP	%	100			50-150	Pass	
Perfluorooctanoic acid (PFOA)	B22-Fe43697	NCP	%	104			50-150	Pass	
Perfluorononanoic acid (PFNA)	B22-Fe43697	NCP	%	98			50-150	Pass	
Perfluorodecanoic acid (PFDA)	B22-Fe43697	NCP	%	87			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	B22-Fe43697	NCP	%	74			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	B22-Fe43697	NCP	%	80			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	B22-Fe43697	NCP	%	106			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B22-Fe43697	NCP	%	77			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances- Ultra Trace				Result 1					
Perfluorooctane sulfonamide (FOSA)	B22-Fe43697	NCP	%	102			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B22-Fe43697	NCP	%	89			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B22-Fe43697	NCP	%	71			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B22-Fe43697	NCP	%	83			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B22-Fe43697	NCP	%	64			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B22-Fe43697	NCP	%	81			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B22-Fe43697	NCP	%	98			50-150	Pass	
Spike - % Recovery									
				Result 1					
Methyldiethanolamine (MDEA)*	L22-Fe30964	CP	%	117			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	L22-Fe30964	CP	%	101			70-130	Pass	
Acenaphthylene	L22-Fe30964	CP	%	106			70-130	Pass	
Anthracene	L22-Fe30964	CP	%	80			70-130	Pass	
Benz(a)anthracene	L22-Fe30964	CP	%	32			70-130	Fail	Q08
Benzo(a)pyrene	L22-Fe30964	CP	%	34			70-130	Fail	Q08
Benzo(b&j)fluoranthene	L22-Fe30964	CP	%	30			70-130	Fail	Q08
Benzo(g.h.i)perylene	L22-Fe30964	CP	%	27			70-130	Fail	Q08
Benzo(k)fluoranthene	L22-Fe30964	CP	%	48			70-130	Fail	Q08
Chrysene	L22-Fe30964	CP	%	42			70-130	Fail	Q08
Dibenz(a.h)anthracene	L22-Fe30964	CP	%	34			70-130	Fail	Q08
Fluoranthene	L22-Fe30964	CP	%	76			70-130	Pass	
Fluorene	L22-Fe30964	CP	%	91			70-130	Pass	
Indeno(1.2.3-cd)pyrene	L22-Fe30964	CP	%	32			70-130	Fail	Q08
Naphthalene	L22-Fe30964	CP	%	99			70-130	Pass	
Phenanthrene	L22-Fe30964	CP	%	81			70-130	Pass	
Pyrene	L22-Fe30964	CP	%	44			70-130	Fail	Q08
Spike - % Recovery									
Alkalinity (speciated)				Result 1					
Total Alkalinity (as CaCO3)	L22-Fe30964	CP	%	68			70-130	Fail	Q08

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	L22-Fe26971	NCP	mg/L	2.6	2.1	24	30%	Pass	
TRH C10-C14	L22-Fe30900	NCP	mg/L	0.19	0.18	4.0	30%	Pass	
TRH C15-C28	L22-Fe30900	NCP	mg/L	3.6	3.8	4.0	30%	Pass	
TRH C29-C36	L22-Fe30900	NCP	mg/L	0.9	1.0	19	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	L22-Fe26971	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Toluene	L22-Fe26971	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	L22-Fe26971	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	L22-Fe26971	NCP	mg/L	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	L22-Fe26971	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	L22-Fe26971	NCP	mg/L	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	L22-Fe26971	NCP	mg/L	0.38	0.60	46	30%	Fail	Q15
TRH C6-C10	L22-Fe26971	NCP	mg/L	4.6	6.1	29	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Diethanolamine (DEA)*	L22-Fe30963	CP	mg/L	< 1	< 1	<1	30%	Pass	
Methyldiethanolamine (MDEA)*	L22-Fe30963	CP	ug/L	< 50	< 50	<1	30%	Pass	
Monoethanolamine (MEA)*	L22-Fe30963	CP	mg/L	< 1	< 1	<1	30%	Pass	
Acidity (as CaCO3)	L22-Fe30963	CP	mg/L	50	52	4.0	30%	Pass	
Ammonia (as N)	L22-Fe32663	NCP	mg/L	0.08	0.08	5.0	30%	Pass	
Chloride	B22-Fe33494	NCP	mg/L	12	12	2.0	30%	Pass	
Conductivity (at 25°C)	L22-Fe30963	CP	uS/cm	140000	140000	<1	30%	Pass	
pH (at 25 °C)	L22-Fe30963	CP	pH Units	7.5	7.4	1.0	30%	Pass	
Phosphate total (as P)	B22-Fe33504	NCP	mg/L	RR	RR	<1	30%	Pass	
Phosphorus filterable reactive (as P)	B22-Fe33494	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Sulphate (as S)	B22-Fe33494	NCP	mg/L	10	10	<1	30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	L22-Fe31152	NCP	mg/L	500	490	3.2	30%	Pass	
Total Kjeldahl Nitrogen (as N)	B22-Fe34676	NCP	mg/L	10	8.2	24	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Acenaphthylene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Anthracene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benz(a)anthracene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(a)pyrene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(b&j)fluoranthene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(g.h.i)perylene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(k)fluoranthene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chrysene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Dibenz(a.h)anthracene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluoranthene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluorene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Naphthalene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Phenanthrene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Pyrene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	L22-Fe30900	NCP	mg/L	0.50	0.52	4.0	30%	Pass	
TRH >C16-C34	L22-Fe30900	NCP	mg/L	4.0	4.2	5.0	30%	Pass	
TRH >C34-C40	L22-Fe30900	NCP	mg/L	0.6	0.7	18	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Total Alkalinity (as CaCO3)	L22-Fe30963	CP	mg/L	130	130	<1	30%	Pass	
Duplicate									
Eurofins Suite B19B: NO3/NO2/NOx				Result 1	Result 2	RPD			
Nitrate & Nitrite (as N)	L22-Fe32663	NCP	mg/L	1.1	0.90	19	30%	Pass	
Nitrate (as N)	L22-Fe32663	NCP	mg/L	1.1	0.87	19	30%	Pass	
Nitrite (as N)	L22-Fe32663	NCP	mg/L	0.03	0.03	1.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	L22-Fe31154	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Aluminium (filtered)	L22-Fe30963	CP	mg/L	< 2.5	< 2.5	<1	30%	Pass	
Arsenic	M22-Fe37409	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Arsenic (filtered)	L22-Fe30963	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Cadmium	M22-Fe37409	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Cadmium (filtered)	L22-Fe30963	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Chromium	M22-Fe37409	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chromium (filtered)	L22-Fe30963	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Copper	M22-Fe37409	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron	L22-Fe31154	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Iron (filtered)	L22-Fe30963	CP	mg/L	< 2.5	< 2.5	<1	30%	Pass	
Lead	M22-Fe37409	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	L22-Fe30963	CP	mg/L	< 0.25	< 0.25	<1	30%	Pass	
Nickel	M22-Fe37409	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Nickel (filtered)	L22-Fe30963	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Selenium (filtered)	L22-Fe30963	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc	M22-Fe37409	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	L22-Fe30963	CP	mg/L	< 0.25	< 0.25	<1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Sodium	L22-Fe31154	NCP	mg/L	570	560	2.0	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B22-Fe32790	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B22-Fe32790	NCP	ug/L	0.03	0.03	1.0	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B22-Fe43697	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B22-Fe43697	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B22-Fe43697	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B22-Fe43697	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B22-Fe43697	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	B22-Fe43697	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	B22-Fe43697	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B22-Fe43697	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B22-Fe43697	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances- Ultra Trace				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	B22-Fe43697	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B22-Fe43697	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B22-Fe43697	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B22-Fe43697	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B22-Fe43697	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B22-Fe43697	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B22-Fe43697	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	

Comments

Eurofins | Environment Testing accreditation number 1261, site 18217 is currently in progress of a controlled transition to a new custom built location at 179 Magowar Road, Girraween, NSW 2145. All results on this report denoted as being performed by Eurofins | Environment Testing Unit F3, Building F, 16 Mars road, Lane Cove West, NSW 2066, corporate site 18217, will have been performed on either Lane Cove or new Girraween site

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
Q05	The matrix spike concentration is less than five times the background concentration in the sample - therefore the spike recovery cannot be determined
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Robert Johnston	Analytical Services Manager
Douglas Todd	Senior Analyst-Metal (WA)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Jonathon Angell	Senior Analyst-Organic (QLD)
Paul Nottle	Senior Analyst-Organic (WA)
Paul Nottle	Senior Analyst-Volatile (WA)
Sam Becker	Senior Analyst-Inorganic (WA)
Sarah McCallion	Senior Analyst-PFAS (QLD)
Scott Beddoes	Senior Analyst-Inorganic (VIC)

Kim Rodgers
Business Unit Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request

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Tetra Tech Coffey Pty Ltd
Bishops See Level 1, 235 St Georges Terrace
Perth
WA 6000

Attention: **Bernie Weekes**

Report **863798-W**
Project name Perdaman
Project ID PEREN295751
Received Date Feb 16, 2022

Client Sample ID			**QC07**	**QC02**
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**L22-Fe30963**	**L22-Fe30964**
Date Sampled			**Feb 10, 2022**	**Feb 09, 2022**
Test/Reference	LOR	Unit		
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	0.07	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	0.1
BTEX				
Benzene	0.001	mg/L	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	124	128
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	0.05
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02
Diethanolamine (DEA)*	0.5	mg/L	< 1	< 1
Methyldiethanolamine (MDEA)*	50	ug/L	< 50	< 50
Monoethanolamine (MEA)*	0.5	mg/L	< 1	< 1
Acidity (as CaCO3)	10	mg/L	50	< 10
Ammonia (as N)	0.01	mg/L	1.3	< 0.01
Chloride	1	mg/L	61000	2600
Conductivity (at 25°C)	10	uS/cm	140000	8800
pH (at 25 °C)	0.1	pH Units	7.5	8.3
Phosphate total (as P)	0.01	mg/L		
Phosphorus filterable reactive (as P)	0.01	mg/L	0.08	0.02
Sulphate (as S)	5	mg/L	2700	120
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	130000	4700
Total Kjeldahl Nitrogen (as N)	0.2	mg/L		
Total Nitrogen (as N)*	0.2	mg/L	-	-

Client Sample ID			QC07	QC02
Sample Matrix			Water	Water
Eurofins Sample No.			L22-Fe30963	L22-Fe30964
Date Sampled			Feb 10, 2022	Feb 09, 2022
Test/Reference	LOR	Unit		
Polycyclic Aromatic Hydrocarbons				
Benzo(a)pyrene TEQ (lower bound) *	0.001	mg/L	< 0.001	< 0.001
Benzo(a)pyrene TEQ (medium bound) *	0.001	mg/L	0.001	0.001
Acenaphthene	0.001	mg/L	< 0.001	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001	< 0.001
Anthracene	0.001	mg/L	< 0.001	< 0.001
Benz(a)anthracene	0.001	mg/L	< 0.001	< 0.001
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.001
Benzo(b&j)fluoranthene[N07]	0.001	mg/L	< 0.001	< 0.001
Benzo(g.h.i)perylene	0.001	mg/L	< 0.001	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	< 0.001	< 0.001
Chrysene	0.001	mg/L	< 0.001	< 0.001
Dibenz(a.h)anthracene	0.001	mg/L	< 0.001	< 0.001
Fluoranthene	0.001	mg/L	< 0.001	< 0.001
Fluorene	0.001	mg/L	< 0.001	< 0.001
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001	< 0.001
Naphthalene	0.001	mg/L	< 0.001	< 0.001
Phenanthrene	0.001	mg/L	< 0.001	< 0.001
Pyrene	0.001	mg/L	< 0.001	< 0.001
Total PAH*	0.001	mg/L	< 0.001	< 0.001
2-Fluorobiphenyl (surr.)	1	%	61	60
p-Terphenyl-d14 (surr.)	1	%	78	77
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
TRH >C10-C16	0.05	mg/L	< 0.05	0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1
Alkalinity (speciated)				
Total Alkalinity (as CaCO3)	20	mg/L	130	370
Eurofins Suite B19B: NO3/NO2/NOx				
Nitrate & Nitrite (as N)	0.05	mg/L	6.1	8.9
Nitrate (as N)	0.02	mg/L	6.1	8.9
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02
Heavy Metals				
Aluminium	0.05	mg/L	< 5	< 0.05
Aluminium (filtered)	0.05	mg/L	< 2.5	< 0.05
Arsenic	0.001	mg/L	0.003	< 0.001
Arsenic (filtered)	0.001	mg/L	< 0.05	< 0.001
Cadmium	0.0002	mg/L	0.0004	< 0.0002
Cadmium (filtered)	0.0002	mg/L	< 0.01	< 0.0002
Chromium	0.001	mg/L	0.002	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.05	< 0.001
Copper	0.001	mg/L	0.003	< 0.001
Iron	0.05	mg/L	< 5	< 0.05
Iron (filtered)	0.05	mg/L	< 2.5	< 0.05
Lead	0.001	mg/L	< 0.001	< 0.001
Manganese (filtered)	0.005	mg/L	< 0.25	< 0.005
Mercury (low-level)	0.00001	mg/L	< 0.0001	< 0.00001
Nickel	0.001	mg/L	0.009	< 0.001
Nickel (filtered)	0.001	mg/L	< 0.05	< 0.001

Client Sample ID			QC07	QC02
Sample Matrix			Water	Water
Eurofins Sample No.			L22-Fe30963	L22-Fe30964
Date Sampled			Feb 10, 2022	Feb 09, 2022
Test/Reference	LOR	Unit		
Heavy Metals				
Selenium (filtered)	0.001	mg/L	< 0.05	0.002
Zinc	0.005	mg/L	< 0.005	< 0.005
Zinc (filtered)	0.005	mg/L	< 0.25	< 0.005
Alkali Metals				
Sodium	0.5	mg/L	47000	2100
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace				
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L		
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L		
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L		
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L		
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L		
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L		
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L		
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L		
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L		
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L		
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L		
13C4-PFBA (surr.)	1	%		
13C5-PFPeA (surr.)	1	%		
13C5-PFHxA (surr.)	1	%		
13C4-PFHpA (surr.)	1	%		
13C8-PFOA (surr.)	1	%		
13C5-PFNA (surr.)	1	%		
13C6-PFDA (surr.)	1	%		
13C2-PFUnDA (surr.)	1	%		
13C2-PFDoDA (surr.)	1	%		
13C2-PFTeDA (surr.)	1	%		
Perfluoroalkyl sulfonic acids (PFSAs)- Ultra Trace				
Perfluorobutanesulfonic acid (PFBS)[N11]	0.001	ug/L		
Perfluorononanesulfonic acid (PFNS)[N15]	0.001	ug/L		
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.001	ug/L		
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.001	ug/L		
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.001	ug/L		
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.001	ug/L		
Perfluorooctanesulfonic acid (PFOS)[N11]	0.0001	ug/L		
Perfluorodecanesulfonic acid (PFDS)[N15]	0.001	ug/L		
13C3-PFBS (surr.)	1	%		
18O2-PFHxS (surr.)	1	%		
13C8-PFOS (surr.)	1	%		
Perfluoroalkyl sulfonamido substances- Ultra Trace				
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L		
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L		
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L		
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L		
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L		
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L		

Client Sample ID			QC07	QC02
Sample Matrix			Water	Water
Eurofins Sample No.			L22-Fe30963	L22-Fe30964
Date Sampled			Feb 10, 2022	Feb 09, 2022
Test/Reference	LOR	Unit		
Perfluoroalkyl sulfonamido substances- Ultra Trace				
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L		
13C8-FOSA (surr.)	1	%		
D3-N-MeFOSA (surr.)	1	%		
D5-N-EtFOSA (surr.)	1	%		
D7-N-MeFOSE (surr.)	1	%		
D9-N-EtFOSE (surr.)	1	%		
D5-N-EtFOSAA (surr.)	1	%		
D3-N-MeFOSAA (surr.)	1	%		
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Ultra Trace				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.001	ug/L		
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.005	ug/L		
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.001	ug/L		
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.001	ug/L		
13C2-4:2 FTSA (surr.)	1	%		
13C2-6:2 FTSA (surr.)	1	%		
13C2-8:2 FTSA (surr.)	1	%		
13C2-10:2 FTSA (surr.)	1	%		
PFASs Summations				
Sum (PFHxS + PFOS)*	0.001	ug/L	-	-
Sum of US EPA PFAS (PFOS + PFOA)*	0.001	ug/L	-	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.001	ug/L	-	-
Sum of WA DWER PFAS (n=10)*	0.005	ug/L	-	-
Sum of PFASs (n=30)*	0.005	ug/L	-	-

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Welshpool	Feb 16, 2022	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Welshpool	Feb 16, 2022	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Welshpool	Feb 16, 2022	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	Welshpool	Feb 16, 2022	7 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Welshpool	Feb 16, 2022	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Diethanolamine (DEA)*	Brisbane	Feb 16, 2022	7 Days
- Method: LCMS_DEA			
Methyldiethanolamine (MDEA)*	Brisbane	Feb 16, 2022	0 Day
- Method:			
Monoethanolamine (MEA)*	Brisbane	Feb 16, 2022	7 Days
- Method: LCMS_MEA			
Eurofins Suite B19B: NO3/NO2/NOx			
Nitrate (as N)	Welshpool	Feb 16, 2022	2 Days
- Method: LTM-INO-4350 - Nitrite, Total Oxidised Nitrogen (NOx) and Nitrate with photometric detection			
Nitrite (as N)	Welshpool	Feb 16, 2022	2 Days
- Method: LTM-INO-4350 - Nitrite, Total Oxidised Nitrogen (NOx) and Nitrate with photometric detection			
Heavy Metals	Melbourne	Feb 18, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mercury (low-level)	Melbourne	Feb 18, 2022	28 Days
- Method: LTM-MET-3050 Mercury by Cold Vapour Atomic Absorption Analysis			
Acidity (as CaCO3)	Welshpool	Feb 16, 2022	14 Days
- Method: LTM-INO-4210 Acidity			
Ammonia (as N)	Welshpool	Feb 16, 2022	28 Days
- Method: LTM-INO-4200 Ammonia by Discrete Analyser			
Chloride	Melbourne	Feb 18, 2022	28 Days
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Conductivity (at 25°C)	Welshpool	Feb 16, 2022	28 Days
- Method: LTM-INO-4030 Conductivity			
pH (at 25 °C)	Welshpool	Feb 16, 2022	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phosphate total (as P)	Melbourne	Feb 18, 2022	28 Days
- Method: LTM-INO-4040 Phosphate by CFA			
Phosphorus filterable reactive (as P)	Melbourne	Feb 18, 2022	2 Days
- Method: APHA 4500-P Phosphate (filterable reactive)			
Sulphate (as S)	Melbourne	Feb 18, 2022	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Total Dissolved Solids Dried at 180°C ± 2°C	Melbourne	Feb 18, 2022	28 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			
Alkalinity (speciated)	Welshpool	Feb 16, 2022	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			
Acid Sulphate Metals : Metals M9 filtered	Welshpool	Feb 16, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Alkali Metals	Welshpool	Feb 16, 2022	6 Months
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Total Nitrogen Set (as N)			
Total Kjeldahl Nitrogen (as N)	Melbourne	Feb 18, 2022	28 Days

Description	Testing Site	Extracted	Holding Time
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Nitrate & Nitrite (as N)	Welshpool	Feb 16, 2022	28 Days
- Method: LTM-INO-4350 - Nitrite, Total Oxidised Nitrogen (NOx) and Nitrate with photometric detection			
Per- and Polyfluoroalkyl Substances (PFASs) - Ultra Trace			
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace	Brisbane	Feb 17, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)- Ultra Trace	Brisbane	Feb 17, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances- Ultra Trace	Brisbane	Feb 17, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) Ultra trace			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Ultra Trace	Brisbane	Feb 17, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Brisbane	Feb 17, 2022	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

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QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
Method Blank							
Diethanolamine (DEA)*	mg/L	< 0.5			0.5	Pass	
Methyldiethanolamine (MDEA)*	ug/L	< 50			50	Pass	
Monoethanolamine (MEA)*	mg/L	< 0.5			0.5	Pass	
Chloride	mg/L	< 1			1	Pass	
Phosphorus filterable reactive (as P)	mg/L	< 0.01			0.01	Pass	
Sulphate (as S)	mg/L	< 5			5	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	mg/L	10			10	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/L	< 0.001			0.001	Pass	
Acenaphthylene	mg/L	< 0.001			0.001	Pass	
Anthracene	mg/L	< 0.001			0.001	Pass	
Benz(a)anthracene	mg/L	< 0.001			0.001	Pass	
Benzo(a)pyrene	mg/L	< 0.001			0.001	Pass	
Benzo(b&j)fluoranthene	mg/L	< 0.001			0.001	Pass	
Benzo(g.h.i)perylene	mg/L	< 0.001			0.001	Pass	
Benzo(k)fluoranthene	mg/L	< 0.001			0.001	Pass	
Chrysene	mg/L	< 0.001			0.001	Pass	
Dibenz(a.h)anthracene	mg/L	< 0.001			0.001	Pass	
Fluoranthene	mg/L	< 0.001			0.001	Pass	
Fluorene	mg/L	< 0.001			0.001	Pass	
Indeno(1.2.3-cd)pyrene	mg/L	< 0.001			0.001	Pass	
Naphthalene	mg/L	< 0.001			0.001	Pass	
Phenanthrene	mg/L	< 0.001			0.001	Pass	
Pyrene	mg/L	< 0.001			0.001	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Heavy Metals							
Aluminium	mg/L	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Arsenic	mg/L	< 0.001			0.001	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (low-level)	mg/L	< 0.00001			0.00001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	92			70-130	Pass	
TRH C10-C14	%	97			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	86			70-130	Pass	
Toluene	%	94			70-130	Pass	
Ethylbenzene	%	103			70-130	Pass	
m&p-Xylenes	%	106			70-130	Pass	
o-Xylene	%	106			70-130	Pass	
Xylenes - Total*	%	106			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	111			70-130	Pass	
TRH C6-C10	%	93			70-130	Pass	
LCS - % Recovery							
Diethanolamine (DEA)*	%	107			70-130	Pass	
Methyldiethanolamine (MDEA)*	%	113			70-130	Pass	
Chloride	%	104			70-130	Pass	
Sulphate (as S)	%	117			70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	%	119			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	117			70-130	Pass	
Acenaphthylene	%	104			70-130	Pass	
Anthracene	%	94			70-130	Pass	
Benz(a)anthracene	%	76			70-130	Pass	
Benzo(a)pyrene	%	83			70-130	Pass	
Benzo(b&j)fluoranthene	%	80			70-130	Pass	
Benzo(g.h.i)perylene	%	86			70-130	Pass	
Benzo(k)fluoranthene	%	84			70-130	Pass	
Chrysene	%	78			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Dibenz(a.h)anthracene			%	102			70-130	Pass	
Fluoranthene			%	87			70-130	Pass	
Fluorene			%	113			70-130	Pass	
Indeno(1.2.3-cd)pyrene			%	82			70-130	Pass	
Naphthalene			%	108			70-130	Pass	
Phenanthrene			%	97			70-130	Pass	
Pyrene			%	87			70-130	Pass	
LCS - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions									
TRH >C10-C16			%	95			70-130	Pass	
LCS - % Recovery									
Heavy Metals									
Aluminium			%	104			80-120	Pass	
Aluminium (filtered)			%	101			80-120	Pass	
Arsenic			%	114			80-120	Pass	
Arsenic (filtered)			%	99			80-120	Pass	
Cadmium			%	103			80-120	Pass	
Cadmium (filtered)			%	96			80-120	Pass	
Chromium			%	115			80-120	Pass	
Chromium (filtered)			%	99			80-120	Pass	
Copper			%	108			80-120	Pass	
Iron			%	104			80-120	Pass	
Iron (filtered)			%	97			80-120	Pass	
Lead			%	84			80-120	Pass	
Manganese (filtered)			%	95			80-120	Pass	
Mercury (low-level)			%	95			80-120	Pass	
Nickel			%	103			80-120	Pass	
Nickel (filtered)			%	96			80-120	Pass	
Selenium (filtered)			%	98			80-120	Pass	
Zinc			%	113			80-120	Pass	
Zinc (filtered)			%	94			80-120	Pass	
LCS - % Recovery									
Alkali Metals									
Sodium			%	117			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	L22-Fe21913	NCP	%	99			70-130	Pass	
TRH C10-C14	L22-Fe30901	NCP	%	97			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	L22-Fe21913	NCP	%	86			70-130	Pass	
Toluene	L22-Fe21913	NCP	%	96			70-130	Pass	
Ethylbenzene	L22-Fe21913	NCP	%	97			70-130	Pass	
m&p-Xylenes	L22-Fe21913	NCP	%	98			70-130	Pass	
o-Xylene	L22-Fe21913	NCP	%	98			70-130	Pass	
Xylenes - Total*	L22-Fe21913	NCP	%	98			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	L22-Fe21913	NCP	%	107			70-130	Pass	
TRH C6-C10	L22-Fe21913	NCP	%	102			70-130	Pass	
Spike - % Recovery									
				Result 1					
Diethanolamine (DEA)*	L22-Fe09367	NCP	%	81			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Ammonia (as N)	L22-Fe30963	CP	%	89			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	L22-Fe30901	NCP	%	96			70-130	Pass	
Spike - % Recovery									
Eurofins Suite B19B: NO3/NO2/NOx				Result 1					
Nitrate & Nitrite (as N)	L22-Fe32663	NCP	%	94			70-130	Pass	
Nitrate (as N)	L22-Fe32663	NCP	%	94			70-130	Pass	
Nitrite (as N)	L22-Fe30963	CP	%	100			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium	L22-Fe31150	NCP	%	Q05			75-125	Fail	
Arsenic	M22-Fe37409	NCP	%	104			75-125	Pass	
Cadmium	M22-Fe37409	NCP	%	103			75-125	Pass	
Chromium	M22-Fe37409	NCP	%	109			75-125	Pass	
Copper	M22-Fe37409	NCP	%	105			75-125	Pass	
Iron	L22-Fe31150	NCP	%	Q05			75-125	Fail	
Lead	M22-Fe37409	NCP	%	93			75-125	Pass	
Nickel	M22-Fe37409	NCP	%	103			75-125	Pass	
Zinc	M22-Fe37409	NCP	%	107			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Sodium	L22-Fe31150	NCP	%	111			75-125	Pass	
Spike - % Recovery									
				Result 1					
Methyldiethanolamine (MDEA)*	L22-Fe30964	CP	%	117			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	L22-Fe30964	CP	%	101			70-130	Pass	
Acenaphthylene	L22-Fe30964	CP	%	106			70-130	Pass	
Anthracene	L22-Fe30964	CP	%	80			70-130	Pass	
Benz(a)anthracene	L22-Fe30964	CP	%	32			70-130	Fail	Q08
Benzo(a)pyrene	L22-Fe30964	CP	%	34			70-130	Fail	Q08
Benzo(b&j)fluoranthene	L22-Fe30964	CP	%	30			70-130	Fail	Q08
Benzo(g.h.i)perylene	L22-Fe30964	CP	%	27			70-130	Fail	Q08
Benzo(k)fluoranthene	L22-Fe30964	CP	%	48			70-130	Fail	Q08
Chrysene	L22-Fe30964	CP	%	42			70-130	Fail	Q08
Dibenz(a.h)anthracene	L22-Fe30964	CP	%	34			70-130	Fail	Q08
Fluoranthene	L22-Fe30964	CP	%	76			70-130	Pass	
Fluorene	L22-Fe30964	CP	%	91			70-130	Pass	
Indeno(1.2.3-cd)pyrene	L22-Fe30964	CP	%	32			70-130	Fail	Q08
Naphthalene	L22-Fe30964	CP	%	99			70-130	Pass	
Phenanthrene	L22-Fe30964	CP	%	81			70-130	Pass	
Pyrene	L22-Fe30964	CP	%	44			70-130	Fail	Q08
Spike - % Recovery									
Alkalinity (speciated)				Result 1					
Total Alkalinity (as CaCO3)	L22-Fe30964	CP	%	68			70-130	Fail	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	L22-Fe26971	NCP	mg/L	2.6	2.1	24	30%	Pass	
TRH C10-C14	L22-Fe30900	NCP	mg/L	0.19	0.18	4.0	30%	Pass	
TRH C15-C28	L22-Fe30900	NCP	mg/L	3.6	3.8	4.0	30%	Pass	
TRH C29-C36	L22-Fe30900	NCP	mg/L	0.9	1.0	19	30%	Pass	

Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	L22-Fe26971	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Toluene	L22-Fe26971	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	L22-Fe26971	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	L22-Fe26971	NCP	mg/L	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	L22-Fe26971	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	L22-Fe26971	NCP	mg/L	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	L22-Fe26971	NCP	mg/L	0.38	0.60	46	30%	Fail	
TRH C6-C10	L22-Fe26971	NCP	mg/L	4.6	6.1	29	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Diethanolamine (DEA)*	L22-Fe30963	CP	mg/L	< 1	< 1	<1	30%	Pass	
Methyldiethanolamine (MDEA)*	L22-Fe30963	CP	ug/L	< 50	< 50	<1	30%	Pass	
Monoethanolamine (MEA)*	L22-Fe30963	CP	mg/L	< 1	< 1	<1	30%	Pass	
Acidity (as CaCO3)	L22-Fe30963	CP	mg/L	50	52	4.0	30%	Pass	
Ammonia (as N)	L22-Fe32663	NCP	mg/L	0.08	0.08	5.0	30%	Pass	
Chloride	B22-Fe33494	NCP	mg/L	12	12	2.0	30%	Pass	
Conductivity (at 25°C)	L22-Fe30963	CP	uS/cm	140000	140000	<1	30%	Pass	
pH (at 25 °C)	L22-Fe30963	CP	pH Units	7.5	7.4	1.0	30%	Pass	
Phosphorus filterable reactive (as P)	B22-Fe33494	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Sulphate (as S)	B22-Fe33494	NCP	mg/L	10	10	<1	30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	L22-Fe31152	NCP	mg/L	500	490	3.2	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Acenaphthylene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Anthracene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benz(a)anthracene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(a)pyrene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(b&j)fluoranthene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(g.h.i)perylene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(k)fluoranthene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chrysene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Dibenz(a.h)anthracene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluoranthene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluorene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Naphthalene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Phenanthrene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Pyrene	L22-Fe14106	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	L22-Fe30900	NCP	mg/L	0.50	0.52	4.0	30%	Pass	
TRH >C16-C34	L22-Fe30900	NCP	mg/L	4.0	4.2	5.0	30%	Pass	
TRH >C34-C40	L22-Fe30900	NCP	mg/L	0.6	0.7	18	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Total Alkalinity (as CaCO3)	L22-Fe30963	CP	mg/L	130	130	<1	30%	Pass	
Duplicate									
Eurofins Suite B19B: NO3/NO2/NOx				Result 1	Result 2	RPD			
Nitrate & Nitrite (as N)	L22-Fe32663	NCP	mg/L	1.1	0.90	19	30%	Pass	
Nitrate (as N)	L22-Fe32663	NCP	mg/L	1.1	0.87	19	30%	Pass	
Nitrite (as N)	L22-Fe32663	NCP	mg/L	0.03	0.03	1.0	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	L22-Fe31154	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Aluminium (filtered)	L22-Fe30963	CP	mg/L	< 2.5	< 2.5	<1	30%	Pass	
Arsenic	M22-Fe37409	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Arsenic (filtered)	L22-Fe30963	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Cadmium	M22-Fe37409	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Cadmium (filtered)	L22-Fe30963	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Chromium	M22-Fe37409	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chromium (filtered)	L22-Fe30963	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Copper	M22-Fe37409	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron	L22-Fe31154	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Iron (filtered)	L22-Fe30963	CP	mg/L	< 2.5	< 2.5	<1	30%	Pass	
Lead	M22-Fe37409	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	L22-Fe30963	CP	mg/L	< 0.25	< 0.25	<1	30%	Pass	
Nickel	M22-Fe37409	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Nickel (filtered)	L22-Fe30963	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Selenium (filtered)	L22-Fe30963	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc	M22-Fe37409	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	L22-Fe30963	CP	mg/L	< 0.25	< 0.25	<1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Sodium	L22-Fe31154	NCP	mg/L	570	560	2.0	30%	Pass	

Comments

Eurofins | Environment Testing accreditation number 1261, site 18217 is currently in progress of a controlled transition to a new custom built location at 179 Magowar Road, Girraween, NSW 2145. All results on this report denoted as being performed by Eurofins | Environment Testing Unit F3, Building F, 16 Mars road, Lane Cove West, NSW 2066, corporate site 18217, will have been performed on either Lane Cove or new Girraween site

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.

Authorised by:

Douglas Todd	Senior Analyst-Metal (WA)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Jonathon Angell	Senior Analyst-Organic (QLD)
Paul Nottle	Senior Analyst-Organic (WA)
Paul Nottle	Senior Analyst-Volatile (WA)
Sam Becker	Senior Analyst-Inorganic (WA)
Sarah McCallion	Senior Analyst-PFAS (QLD)
Scott Beddoes	Senior Analyst-Inorganic (VIC)

Kim Rodgers

Business Unit Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201196**	Page	: 1 of 29
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman PSI	Date Samples Received	: 02-Feb-2022 14:40
Order number	: ----	Date Analysis Commenced	: 03-Feb-2022
C-O-C number	: ----	Issue Date	: 09-Feb-2022 22:21
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 42		
No. of samples analysed	: 26		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Uyen Dalkin	Approved Asbestos Identifier	Melbourne Asbestos, Springvale, VIC
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EA200(B/G) conducted by ALS Melbourne, NATA accreditation no. 825, site no 13778
- EP231X, EP262 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP262 :Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.
- EP262: Matrix spike recovery not determined due to dilution requirement.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG020: Metals LOR for samples EP2201196-031, -032 and -036 raised due to high TDS content.
- EK059G (NOx): LOR for sample EP2201196-031 raised due to possible sample matrix interference.
- EG035T-LL: LOR raised for Hg on sample EP2201196-031, 032 and 036 due to high TDS content.
- EP071 (TRH): Poor duplicate precision due to suspected sample heterogeneity. Chromatogram profiles have been reveiwed.
- **EA200 Legend**
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Ch' Chrysotile (white asbestos)

- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EP262: ALS is not NATA accredited for the analysis of MDEA.
- EA200: Analysis of asbestos from swabs and tapes is not covered under the current scope of NATA accreditation.
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.
- EA200: N/A - Not Applicable
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS10_0	SS10_0.5	SS8_0	SS8_0.5	SS7_0
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-001	EP2201196-002	EP2201196-004	EP2201196-005	EP2201196-008
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	1.6	1.3	1.7	2.7	1.4
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	No
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	No	No	No
Asbestos Type	1332-21-4	-	--	-	-	-	-	-
Sample weight (dry)	----	0.01	g	20.4	24.3	23.0	25.9	22.5
APPROVED IDENTIFIER:	----	-	--	U.DALKIN	U.DALKIN	U.DALKIN	U.DALKIN	U.DALKIN
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	No	No	No
Organic Fibre	----	0.1	g/kg	Yes	Yes	Yes	Yes	Yes
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	6	<5	8
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	33	72	47	43	18
Copper	7440-50-8	5	mg/kg	16	26	15	18	6
Lead	7439-92-1	5	mg/kg	6	13	6	9	<5
Nickel	7440-02-0	2	mg/kg	21	33	16	26	7
Zinc	7440-66-6	5	mg/kg	29	37	16	25	8
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS7_0.5	SS6_0	SS6_0.5	SS5_0	SS5_0.5
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-009	EP2201196-012	EP2201196-013	EP2201196-016	EP2201196-017
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	3.4	3.5	4.0	1.8	1.8
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	No
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	No	No	No
Asbestos Type	1332-21-4	-	--	-	-	-	-	-
Sample weight (dry)	----	0.01	g	22.1	19.3	27.2	24.2	12.7
APPROVED IDENTIFIER:	----	-	--	U.DALKIN	U.DALKIN	U.DALKIN	U.DALKIN	U.DALKIN
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	No	No	No
Organic Fibre	----	0.1	g/kg	Yes	Yes	No	Yes	Yes
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	6	7
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	37	33	20	33	24
Copper	7440-50-8	5	mg/kg	13	26	20	20	19
Lead	7439-92-1	5	mg/kg	8	6	<5	12	12
Nickel	7440-02-0	2	mg/kg	22	21	16	18	16
Zinc	7440-66-6	5	mg/kg	26	15	13	17	22
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS2_0	SS2_1.0	SS3_0	SS3_0.5	SS4_0
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-019	EP2201196-021	EP2201196-023	EP2201196-024	EP2201196-026
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	8.8	6.4	<1.0	1.4	<1.0
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	No
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	No	No	No
Asbestos Type	1332-21-4	-	--	-	-	-	-	-
Sample weight (dry)	----	0.01	g	25.0	192	29.3	26.5	22.9
APPROVED IDENTIFIER:	----	-	--	U.DALKIN	U.DALKIN	U.DALKIN	U.DALKIN	U.DALKIN
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	No	No	No
Organic Fibre	----	0.1	g/kg	Yes	Yes	Yes	No	Yes
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	9	5	11
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	33	37	13	243	12
Copper	7440-50-8	5	mg/kg	15	20	<5	19	<5
Lead	7439-92-1	5	mg/kg	<5	6	<5	10	<5
Nickel	7440-02-0	2	mg/kg	14	23	4	18	4
Zinc	7440-66-6	5	mg/kg	15	19	<5	19	<5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS2_0	SS2_1.0	SS3_0	SS3_0.5	SS4_0
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-019	EP2201196-021	EP2201196-023	EP2201196-024	EP2201196-026
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS2_0	SS2_1.0	SS3_0	SS3_0.5	SS4_0
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-019	EP2201196-021	EP2201196-023	EP2201196-024	EP2201196-026
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS2_0	SS2_1.0	SS3_0	SS3_0.5	SS4_0
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-019	EP2201196-021	EP2201196-023	EP2201196-024	EP2201196-026
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS2_0	SS2_1.0	SS3_0	SS3_0.5	SS4_0
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-019	EP2201196-021	EP2201196-023	EP2201196-024	EP2201196-026
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS2_0	SS2_1.0	SS3_0	SS3_0.5	SS4_0
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-019	EP2201196-021	EP2201196-023	EP2201196-024	EP2201196-026
				Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued								
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	70.4	77.8	95.4	100	108
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	59.8	69.8	92.7	97.1	100
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	57.4	51.7	43.0	39.8	35.8
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	72.7	72.7	62.0	62.7	92.3
2-Chlorophenol-D4	93951-73-6	0.5	%	59.0	83.9	97.1	77.4	102
2.4.6-Tribromophenol	118-79-6	0.5	%	43.3	81.7	54.4	58.0	53.5
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	83.4	111	110	104	122
Anthracene-d10	1719-06-8	0.5	%	87.0	111	100	94.7	96.4
4-Terphenyl-d14	1718-51-0	0.5	%	85.3	124	93.8	90.9	109
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	86.0	88.1	89.0	88.5	92.3
Toluene-D8	2037-26-5	0.2	%	78.8	81.5	77.7	78.9	80.9
4-Bromofluorobenzene	460-00-4	0.2	%	94.4	96.3	97.9	98.1	100
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	108	112	104	108	110
13C8-PFOA	----	0.0002	%	102	112	110	104	105

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS4_0.5	SS1_0	SS1_0.5	QC32	QC34
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-027	EP2201196-028	EP2201196-029	EP2201196-034	EP2201196-035
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	3.0	<1.0	2.8	2.9	7.2
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	----	----
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	No	----	----
Asbestos Type	1332-21-4	-	--	-	-	-	----	----
Sample weight (dry)	----	0.01	g	29.9	30.1	18.8	----	----
APPROVED IDENTIFIER:	----	-	--	U.DALKIN	U.DALKIN	U.DALKIN	----	----
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	No	----	----
Organic Fibre	----	0.1	g/kg	Yes	Yes	Yes	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	6	8	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	28	16	26	35	39
Copper	7440-50-8	5	mg/kg	14	6	25	14	16
Lead	7439-92-1	5	mg/kg	5	<5	17	7	6
Nickel	7440-02-0	2	mg/kg	16	6	15	19	18
Zinc	7440-66-6	5	mg/kg	19	8	29	26	20
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	----	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS4_0.5	SS1_0	SS1_0.5	QC32	QC34
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-027	EP2201196-028	EP2201196-029	EP2201196-034	EP2201196-035
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	----	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	----	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	----	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	----	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS4_0.5	SS1_0	SS1_0.5	QC32	QC34
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-027	EP2201196-028	EP2201196-029	EP2201196-034	EP2201196-035
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	----	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	----	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	----	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	----	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	----	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	----	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	----	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	----	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	----	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	----	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	----	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	----	<50

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS4_0.5	SS1_0	SS1_0.5	QC32	QC34
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-027	EP2201196-028	EP2201196-029	EP2201196-034	EP2201196-035
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	----	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	----	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS4_0.5	SS1_0	SS1_0.5	QC32	QC34
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-027	EP2201196-028	EP2201196-029	EP2201196-034	EP2201196-035
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SS4_0.5	SS1_0	SS1_0.5	QC32	QC34
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-027	EP2201196-028	EP2201196-029	EP2201196-034	EP2201196-035
				Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued								
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	104	105	71.8	----	82.6
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	92.4	103	113	----	87.0
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	38.2	44.0	43.3	----	37.9
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	84.9	100	90.4	----	74.3
2-Chlorophenol-D4	93951-73-6	0.5	%	80.6	116	85.0	----	93.1
2.4.6-Tribromophenol	118-79-6	0.5	%	78.5	80.7	76.4	----	76.5
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	103	111	112	----	99.8
Anthracene-d10	1719-06-8	0.5	%	104	115	106	----	96.8
4-Terphenyl-d14	1718-51-0	0.5	%	90.5	102	98.2	----	91.7
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	90.1	90.1	89.6	----	85.4
Toluene-D8	2037-26-5	0.2	%	86.1	83.4	85.9	----	79.4
4-Bromofluorobenzene	460-00-4	0.2	%	106	98.8	104	----	96.5
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	117	116	102	----	114
13C8-PFOA	----	0.0002	%	108	103	105	----	102

Analytical Results

Sub-Matrix: SOLID (Matrix: SOLID)			Sample ID	SS1_OH	----	----	----	----
			Sampling date / time	29-Jan-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2201196-033	--------	--------	--------	--------
				Result	----	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples								
Asbestos Detected	1332-21-4	0.1	g/kg	**Yes**	----	----	----	----
Asbestos Type	1332-21-4	-	--	**Ch**	----	----	----	----
Asbestos (Trace)	1332-21-4	5	Fibres	**N/A**	----	----	----	----
Sample weight (dry)	----	0.01	g	**6.70**	----	----	----	----
Synthetic Mineral Fibre	----	0.1	g/kg	**Yes**	----	----	----	----
Organic Fibre	----	0.1	g/kg	**No**	----	----	----	----
APPROVED IDENTIFIER:	----	-	--	**U.DALKIN**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SW4	SW5	QC36	QC38	QC39
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-031	EP2201196-032	EP2201196-036	EP2201196-037	EP2201196-038
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.052	<0.021	<0.021	----	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0052	<0.0021	<0.0021	----	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.052	<0.021	<0.021	----	<0.001
Copper	7440-50-8	0.001	mg/L	<0.052	<0.021	<0.021	----	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.052	<0.021	<0.021	----	<0.001
Lead	7439-92-1	0.001	mg/L	<0.052	<0.021	<0.021	----	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.262	<0.105	<0.105	----	<0.005
EG035T: Total Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	<0.00020	<0.00020	<0.00020	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	----	----	----	----	<0.0001
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.06**	**0.10**	**0.08**	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.05	<0.01	<0.01	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.05	<0.01	<0.01	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**2.8**	**1.0**	**1.0**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**2.8**	**1.0**	**1.0**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.22**	**0.07**	**0.08**	----	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	<1	<1	<1	----	<1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	----	----	----	----	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	----	----	----	----	<0.5
beta-BHC	319-85-7	0.5	µg/L	----	----	----	----	<0.5
gamma-BHC	58-89-9	0.5	µg/L	----	----	----	----	<0.5
delta-BHC	319-86-8	0.5	µg/L	----	----	----	----	<0.5

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SW4	SW5	QC36	QC38	QC39
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-031	EP2201196-032	EP2201196-036	EP2201196-037	EP2201196-038
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Heptachlor	76-44-8	0.5	µg/L	----	----	----	----	<0.5
Aldrin	309-00-2	0.5	µg/L	----	----	----	----	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L	----	----	----	----	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L	----	----	----	----	<0.5
alpha-Endosulfan	959-98-8	0.5	µg/L	----	----	----	----	<0.5
cis-Chlordane	5103-71-9	0.5	µg/L	----	----	----	----	<0.5
Dieldrin	60-57-1	0.5	µg/L	----	----	----	----	<0.5
4.4`-DDE	72-55-9	0.5	µg/L	----	----	----	----	<0.5
Endrin	72-20-8	0.5	µg/L	----	----	----	----	<0.5
beta-Endosulfan	33213-65-9	0.5	µg/L	----	----	----	----	<0.5
4.4`-DDD	72-54-8	0.5	µg/L	----	----	----	----	<0.5
Endrin aldehyde	7421-93-4	0.5	µg/L	----	----	----	----	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L	----	----	----	----	<0.5
4.4`-DDT	50-29-3	2.0	µg/L	----	----	----	----	<2.0
Endrin ketone	53494-70-5	0.5	µg/L	----	----	----	----	<0.5
Methoxychlor	72-43-5	2.0	µg/L	----	----	----	----	<2.0
^ Total Chlordane (sum)	----	0.5	µg/L	----	----	----	----	<0.5
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	----	----	----	----	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	----	----	----	----	<0.5
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	----	----	----	----	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L	----	----	----	----	<0.5
Monocrotophos	6923-22-4	2.0	µg/L	----	----	----	----	<2.0
Dimethoate	60-51-5	0.5	µg/L	----	----	----	----	<0.5
Diazinon	333-41-5	0.5	µg/L	----	----	----	----	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	----	----	----	----	<0.5
Parathion-methyl	298-00-0	2.0	µg/L	----	----	----	----	<2.0
Malathion	121-75-5	0.5	µg/L	----	----	----	----	<0.5
Fenthion	55-38-9	0.5	µg/L	----	----	----	----	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	----	----	----	----	<0.5
Parathion	56-38-2	2.0	µg/L	----	----	----	----	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L	----	----	----	----	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	----	----	----	----	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L	----	----	----	----	<0.5

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SW4	SW5	QC36	QC38	QC39
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-031	EP2201196-032	EP2201196-036	EP2201196-037	EP2201196-038
				Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued								
Fenamiphos	22224-92-6	0.5	µg/L	----	----	----	----	<0.5
Prothiofos	34643-46-4	0.5	µg/L	----	----	----	----	<0.5
Ethion	563-12-2	0.5	µg/L	----	----	----	----	<0.5
Carbophenothion	786-19-6	0.5	µg/L	----	----	----	----	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	----	----	----	----	<0.5
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	----	----	----	----	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	----	----	----	----	<1.0
Acenaphthene	83-32-9	1.0	µg/L	----	----	----	----	<1.0
Fluorene	86-73-7	1.0	µg/L	----	----	----	----	<1.0
Phenanthrene	85-01-8	1.0	µg/L	----	----	----	----	<1.0
Anthracene	120-12-7	1.0	µg/L	----	----	----	----	<1.0
Fluoranthene	206-44-0	1.0	µg/L	----	----	----	----	<1.0
Pyrene	129-00-0	1.0	µg/L	----	----	----	----	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	----	----	----	----	<1.0
Chrysene	218-01-9	1.0	µg/L	----	----	----	----	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	----	----	----	----	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	----	----	----	----	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	----	----	----	----	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	----	----	----	----	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	----	----	----	----	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	----	----	----	----	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	----	----	----	----	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	----	----	----	----	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	----	----	----	<20	<20
C10 - C14 Fraction	----	50	µg/L	----	----	----	<50	<50
C15 - C28 Fraction	----	100	µg/L	----	----	----	<100	<100
C29 - C36 Fraction	----	50	µg/L	----	----	----	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	----	----	----	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	----	----	----	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	----	----	----	<20	<20

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SW4	SW5	QC36	QC38	QC39
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-031	EP2201196-032	EP2201196-036	EP2201196-037	EP2201196-038
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
>C10 - C16 Fraction	----	100	µg/L	----	----	----	<100	<100
>C16 - C34 Fraction	----	100	µg/L	----	----	----	<100	<100
>C34 - C40 Fraction	----	100	µg/L	----	----	----	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	----	----	----	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	----	----	----	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	----	----	----	<1	<1
Toluene	108-88-3	2	µg/L	----	----	----	<2	<2
Ethylbenzene	100-41-4	2	µg/L	----	----	----	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	----	<2	<2
ortho-Xylene	95-47-6	2	µg/L	----	----	----	<2	<2
^ Total Xylenes	----	2	µg/L	----	----	----	<2	<2
^ Sum of BTEX	----	1	µg/L	----	----	----	<1	<1
Naphthalene	91-20-3	5	µg/L	----	----	----	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	**0.0020**	**0.0005**	<0.0005	----	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	----	----	----	----	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	----	----	----	----	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	----	----	----	----	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	----	----	----	----	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SW4	SW5	QC36	QC38	QC39
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-031	EP2201196-032	EP2201196-036	EP2201196-037	EP2201196-038
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	----	----	----	----	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	----	----	----	----	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	----	----	----	----	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	----	----	----	----	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	----	----	----	----	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	----	----	----	----	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	----	----	----	----	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	----	----	----	----	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	----	----	----	----	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	----	----	----	----	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	----	----	----	----	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	----	----	----	----	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	----	----	----	----	<0.05
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	**0.123**	**0.0165**	**0.0142**	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	**0.698**	**0.0765**	**0.0715**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	**0.0180**	**0.0178**	**0.0194**	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	**0.0586**	**0.0611**	**0.0619**	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	**0.0017**	**0.0029**	**0.0028**	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SW4	SW5	QC36	QC38	QC39
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-031	EP2201196-032	EP2201196-036	EP2201196-037	EP2201196-038
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	----	----	----	----	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	----	----	----	----	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	----	----	----	----	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	----	----	----	----	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	----	----	----	----	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	----	----	----	----	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	----	----	----	----	<0.02
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	<0.001	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	<0.001	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	<0.001	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SW4	SW5	QC36	QC38	QC39
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-031	EP2201196-032	EP2201196-036	EP2201196-037	EP2201196-038
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	----	----	----	----	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	----	----	----	----	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	----	----	----	----	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	----	----	----	----	<0.05
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	----	----	----	----	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	----	----	----	----	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	----	----	----	----	<0.01
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	----	----
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	**0.901**	**0.175**	**0.170**	----	----
^ Sum of PFAS	----	0.0002	µg/L	**0.901**	**0.175**	**0.170**	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<10	<10	<10	----	<10
Diethanolamine	111-42-2	1	µg/L	<10	<10	<10	----	<10
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<10	<10	<10	----	<10
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	1	%	**90.0**	**110**	**116**	----	**108**
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	----	----	----	----	**86.0**
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	----	----	----	----	**69.4**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	SW4	SW5	QC36	QC38	QC39
			Sampling date / time	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00	29-Jan-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201196-031	EP2201196-032	EP2201196-036	EP2201196-037	EP2201196-038
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	----	----	----	----	17.1
2-Chlorophenol-D4	93951-73-6	1.0	%	----	----	----	----	35.8
2.4.6-Tribromophenol	118-79-6	1.0	%	----	----	----	----	30.1
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	----	----	----	----	40.7
Anthracene-d10	1719-06-8	1.0	%	----	----	----	----	61.5
4-Terphenyl-d14	1718-51-0	1.0	%	----	----	----	----	47.9
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	----	----	----	81.6	89.9
Toluene-D8	2037-26-5	2	%	----	----	----	103	106
4-Bromofluorobenzene	460-00-4	2	%	----	----	----	92.9	91.8
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	----	----	----	----	95.8
13C8-PFOA	----	0.02	%	----	----	----	----	98.9
13C4-PFOS	----	0.0005	%	96.2	98.6	104	----	----
13C8-PFOA	----	0.0005	%	81.4	82.8	80.9	----	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	SS2_1.0 - 29-Jan-2022 00:00	Brown orange soil with rock and organic matter.
EA200: Description	SS10_0 - 29-Jan-2022 00:00	Tan sandy soil with rock, organic and shell like matter.
EA200: Description	SS10_0.5 - 29-Jan-2022 00:00	Orange soil with rock and organic matter.
EA200: Description	SS8_0 - 29-Jan-2022 00:00	Beige soil with organic matter.
EA200: Description	SS8_0.5 - 29-Jan-2022 00:00	Tan sandy soil with rock, organic and shell like matter.
EA200: Description	SS7_0 - 29-Jan-2022 00:00	Tan sandy soil with rock, organic and shell like matter.
EA200: Description	SS7_0.5 - 29-Jan-2022 00:00	Tan sandy soil with rock, organic and shell like matter.
EA200: Description	SS6_0 - 29-Jan-2022 00:00	Tan sandy soil with rock, organic and shell like matter.
EA200: Description	SS6_0.5 - 29-Jan-2022 00:00	Orange soil with rock matter.
EA200: Description	SS5_0 - 29-Jan-2022 00:00	Orange soil with rock and organic matter.
EA200: Description	SS5_0.5 - 29-Jan-2022 00:00	Beige orange soil with rock and organic matter.
EA200: Description	SS2_0 - 29-Jan-2022 00:00	Orange soil with rock and organic matter.
EA200: Description	SS3_0 - 29-Jan-2022 00:00	Tan sandy soil with rock, organic and shell like matter.
EA200: Description	SS3_0.5 - 29-Jan-2022 00:00	Orange soil with rock matter.
EA200: Description	SS4_0 - 29-Jan-2022 00:00	Tan sandy soil with rock, organic and shell like matter.
EA200: Description	SS4_0.5 - 29-Jan-2022 00:00	Beige orange soil with rock and organic matter.
EA200: Description	SS1_0 - 29-Jan-2022 00:00	Tan sandy soil with rock, organic and shell like matter.
EA200: Description	SS1_0.5 - 29-Jan-2022 00:00	Tan sandy soil with rock and organic matter.

Sub-Matrix: **SOLID**

Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples		
EA200: Description	SS1_OH - 29-Jan-2022 00:00	Asbestos sheets with synthetic mineral fibres approx 130 x 45 x 1mm.

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	43	119
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	53	152
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	28	152
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	57	119
2-Chlorophenol-D4	93951-73-6	52	130
2.4.6-Tribromophenol	118-79-6	40	132
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	53	139
Anthracene-d10	1719-06-8	68	124
4-Terphenyl-d14	1718-51-0	66	132
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	63	132
Toluene-D8	2037-26-5	66	125
4-Bromofluorobenzene	460-00-4	60	124
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	27	136
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	50	146
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	27	153
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	67
2-Chlorophenol-D4	93951-73-6	29	120
2.4.6-Tribromophenol	118-79-6	10	131
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	34	131
Anthracene-d10	1719-06-8	43	126
4-Terphenyl-d14	1718-51-0	41	142

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Melbourne, NATA accreditation no. 825, site no. 13778 (Chemistry).

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

(SOLID) EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(WATER) EP262: Ethanolamines

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2201196**	Page	: 1 of 22
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman PSI	Date Samples Received	: 02-Feb-2022
Order number	: ----	Date Analysis Commenced	: 03-Feb-2022
C-O-C number	: ----	Issue Date	: 09-Feb-2022
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 42		
No. of samples analysed	: 26		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Uyen Dalkin	Approved Asbestos Identifier	Melbourne Asbestos, Springvale, VIC
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4159670)									
EP2201196-001	SS10_0	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	33	35	5.6	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	21	19	9.1	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	16	15	9.1	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	6	7	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	29	26	7.5	No Limit
EP2201196-019	SS2_0	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	33	32	3.7	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	14	15	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	15	18	20.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	15	15	0.0	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4159664)									
EP2201196-001	SS10_0	EA055: Moisture Content	----	0.1	%	1.6	1.6	0.0	No Limit
EP2201196-017	SS5_0.5	EA055: Moisture Content	----	0.1	%	1.8	1.8	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4159671)									
EP2201196-001	SS10_0	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP2201196-019	SS2_0	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 4153399)									
EP2201196-019	SS2_0	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4153397)									

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4153397) - continued									
EP2201196-019	SS2_0	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4153397)									
EP2201196-019	SS2_0	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4153397) - continued									
EP2201196-019	SS2_0	EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4153398)									
EP2201196-019	SS2_0	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4153396)									
EP2200977-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	140	130	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	120	120	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP2201196-019	SS2_0	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4153400)									
EP2200977-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP2201196-028	SS1_0	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4153396)									
EP2200977-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	240	230	5.5	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4153396) - continued									
EP2201196-019	SS2_0	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	110	13.2	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4153400)									
EP2200977-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP2201196-028	SS1_0	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080: BTEXN (QC Lot: 4153400)									
EP2200977-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EP2201196-028	SS1_0	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4157855)									
EP2201196-019	SS2_0	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4157855)									
EP2201196-019	SS2_0	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4157855)									
EP2201196-019	SS2_0	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4157855)									
EP2201196-019	SS2_0	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 4154709)									
EP2201196-031	SW4	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0052	<0.0052	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.052	<0.052	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.052	<0.052	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.052	<0.052	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.052	<0.052	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.052	<0.052	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.262	<0.262	0.0	No Limit
EP2201207-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
EG035T: Total Mercury by FIMS (QC Lot: 4154713)									

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EG035T: Total Mercury by FIMS (QC Lot: 4154713) - continued									
EP2201196-036	QC36	EG035T-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00020	<0.00020	0.0	No Limit
EP2201202-019	Anonymous	EG035T-LL: Mercury	7439-97-6	0.00004	mg/L	0.00128	0.00112	13.3	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4154714)									
EP2201196-038	QC39	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 4153472)									
EP2201196-032	SW5	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.10	0.10	0.0	No Limit
EP2201214-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.84	0.88	4.6	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4153466)									
EP2201231-010	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP2201205-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4153473)									
EP2201196-032	SW5	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP2201214-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4154958)									
EP2201053-008	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	0.1	0.0	No Limit
EP2201058-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.4	1.4	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4154957)									
EP2201053-008	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.01	0.02	0.0	No Limit
EP2201058-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.39	0.39	0.0	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4154314)									
EP2201059-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP2201210-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4154501)									
EP2201159-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	7650	# 13700	56.4	0% - 20%
		EP071: C10 - C14 Fraction	----	50	µg/L	510	690	30.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	1970	# 4370	75.8	0% - 50%
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4154314)									
EP2201059-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP2201210-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4154501)									
EP2201159-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	1380	2090	41.1	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	8220	# 15500	61.6	0% - 20%
		EP071: >C34 - C40 Fraction	----	100	µg/L	1020	2360	79.3	No Limit
EP080: BTEXN (QC Lot: 4154314)									
EP2201059-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080: BTEXN (QC Lot: 4154314) - continued									
EP2201059-001	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP2201210-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4156437)									
ES2203001-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.04	0.03	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4156437)									
ES2203001-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.14	0.14	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4156437)									
ES2203001-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4156437) - continued									
ES2203001-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4156437)									
ES2203001-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4156437)									
ES2203001-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.20	0.19	5.1	0% - 20%
EP262: Ethanolamines (QC Lot: 4156370)									
EP2201196-031	SW4	EP262: Ethanolamine	141-43-5	1	µg/L	<10	<10	0.0	No Limit
		EP262: Diethanolamine	111-42-2	1	µg/L	<10	<10	0.0	No Limit
		EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<10	<10	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4159670)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	103	81.5	118
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	99.1	76.2	106
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	87.8	66.9	138
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	102	79.1	113
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	92.5	78.9	112
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	99.6	81.5	126
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	99.0	81.0	119
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4159671)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.154 mg/kg	91.9	81.0	115
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4153399)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	0.5 mg/kg	90.0	41.0	111
EP068A: Organochlorine Pesticides (OC) (QCLot: 4153397)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	105	46.0	116
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	94.0	53.0	133
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	69.4	45.0	117
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	87.8	46.0	122
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	83.0	47.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	84.2	40.0	118
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	88.3	47.0	123
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	43.4	41.0	119
EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	88.5	43.0	119
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	64.7	41.0	131
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	114	41.0	119
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	82.8	41.0	127
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	79.4	44.0	122
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	62.6	37.0	129
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	107	41.0	127
EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	85.8	42.0	122
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	37.9	31.2	117
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	95.1	38.0	120
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	57.0	31.4	125
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	72.5	31.2	123

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4153397) - continued								
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	92.4	24.7	125
EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4153397)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	89.6	61.0	141
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	80.4	39.0	147
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	8.0	4.10	154
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	98.3	40.0	136
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	110	59.0	133
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	98.2	57.0	135
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	81.8	39.0	133
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	106	53.0	131
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	100.0	53.0	133
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	102	57.0	135
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	79.9	45.0	131
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	83.3	53.0	137
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	80.8	53.0	133
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	66.1	49.0	133
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	95.7	39.0	137
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	83.7	57.0	137
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	90.5	53.0	135
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	66.8	52.0	134
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	30.6	20.4	154
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4153398)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	89.5	71.0	123
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	96.8	69.0	129
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	84.5	65.0	125
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	93.9	71.0	125
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	122	66.0	124
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	88.8	60.0	112
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	92.0	67.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	123	65.0	127
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	110	57.0	125
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	111	57.0	131
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	111	65.0	125
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	110	69.0	127

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4153398) - continued								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	105	63.0	121
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	96.4	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	105	52.0	128
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	68.4	65.0	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4153396)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	1468 mg/kg	87.7	70.0	111
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3111 mg/kg	96.3	71.9	109
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	436 mg/kg	103	63.8	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4153400)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	32 mg/kg	89.0	66.0	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4153396)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	2234 mg/kg	90.0	72.8	110
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	2553 mg/kg	101	67.8	114
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	95.1	50.3	123
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4153400)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	37 mg/kg	88.8	66.0	122
EP080: BTEXN (QCLot: 4153400)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	76.1	72.0	122
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	88.6	75.0	119
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	89.9	73.0	121
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	98.9	74.0	122
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	92.1	75.0	121
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	102	64.0	126
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4157855)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.6	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.6	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4157855)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	98.5	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.4	72.0	129

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4157855) - continued								
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.8	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4157855)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.3	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.0	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.1	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.9	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.6	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4157855)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	94.0	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	115	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	90.8	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	118	69.2	143

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 4154709)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	89.6	118
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.5	89.2	116
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.8	87.8	114
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.4	85.8	115
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	88.4	111
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.1	87.4	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.9	88.1	120
EG035T: Total Mercury by FIMS (QCLot: 4154713)								
EG035T-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00004	0.01 mg/L	101	89.0	116
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4154714)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.8	85.1	115
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4153472)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4153472) - continued								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	99.6	86.2	111
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4153466)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	102	88.7	113
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4153473)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	106	90.5	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4154958)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	95.2	75.8	100
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4154957)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	92.4	70.0	110
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4154502)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	5 µg/L	82.0	36.2	90.2
EP068A: Organochlorine Pesticides (OC) (QCLot: 4154503)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	69.2	42.3	112
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	64.8	39.0	108
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	68.8	45.5	116
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	104	43.0	118
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	89.2	46.2	115
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	79.4	39.0	111
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	108	39.7	114
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	74.9	42.4	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	55.0	43.6	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	100.0	42.1	129
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	88.9	42.7	123
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	92.6	42.4	121
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	91.7	43.8	123
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	90.9	26.9	127
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	92.6	44.9	128
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	98.7	41.7	128
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	38.1	32.2	121
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	75.3	40.7	120
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	38.6	31.6	123
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	81.1	36.4	124
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	43.6	25.4	124
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4154503)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	109	38.8	110
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	83.9	34.6	115
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	3.8	----	----
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	42.2	27.8	102

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4154503) - continued								
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	88.1	46.1	122
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	57.3	46.6	118
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	93.7	26.8	110
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	81.9	38.8	119
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	65.1	45.0	119
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	73.7	44.6	118
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	62.0	30.2	112
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	65.1	43.2	123
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	81.2	41.1	119
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	88.3	34.4	125
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	58.2	19.9	123
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	92.2	38.0	121
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	54.5	39.5	121
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	43.3	39.7	119
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	13.5	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4154504)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	51.6	41.9	99.1
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	54.0	36.1	113
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	54.5	35.8	102
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	56.3	33.5	113
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	60.4	36.5	115
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	61.7	46.4	109
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	67.1	40.4	124
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	69.1	40.2	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	62.2	40.2	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	63.2	45.6	121
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	10 µg/L	64.4	43.2	123
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	65.2	47.3	121
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	63.2	44.8	123
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	60.7	38.8	120
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	60.9	39.4	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	62.3	40.1	123
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4154314)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	107	73.6	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4154501)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	381 µg/L	87.7	39.3	103

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4154501) - continued								
EP071: C15 - C28 Fraction	----	100	µg/L	<100	389 µg/L	116	47.2	122
EP071: C29 - C36 Fraction	----	50	µg/L	<50	282 µg/L	77.7	42.5	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4154314)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	106	73.9	115
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4154501)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	393 µg/L	88.0	42.0	104
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	507 µg/L	98.1	46.2	116
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	276 µg/L	72.4	24.7	137
EP080: BTEXN (QCLot: 4154314)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	109	84.1	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	106	81.0	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	108	84.4	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	110	84.3	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	109	86.5	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	78.9	77.0	118
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4156435)								
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	111	72.0	130
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	91.2	71.0	127
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	95.6	68.0	131
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	106	69.0	134
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	95.2	65.0	140
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	77.6	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4156437)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	94.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	92.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	89.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	100	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	94.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4156435)								
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	92.5	73.0	129
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	99.2	72.0	129
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	113	72.0	129
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	99.6	72.0	130
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	96.0	71.0	133
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	97.6	69.0	130
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	92.8	71.0	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4156435) - continued								
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	94.4	69.0	133
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	98.8	72.0	134
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	142	65.0	144
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	111	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4156437)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	100	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	129	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	114	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	108	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	118	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	120	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	117	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	86.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	77.8	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	112	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4156435)								
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	98.4	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	113	68.0	141
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	101	56.6	136
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	104	61.9	129
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	90.2	52.8	135
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	75.6	65.0	136
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	110	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4156437)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	108	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	110	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	110	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	105	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	120	57.6	145

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4156437) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	106	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	103	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4156435)								
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	100	63.0	143
EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.004 µg/L	84.4	64.0	140
EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.004 µg/L	102	67.0	138
EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	0.004 µg/L	79.2	60.9	136
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4156437)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	98.4	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	117	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	86.2	71.4	144
EP231P: PFAS Sums (QCLot: 4156435)								
EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	----	----	----	----
EP262: Ethanolamines (QCLot: 4156370)								
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	92.4	50.0	130
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	82.4	50.0	130
EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	10 µg/L	98.2	50.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4159670)							
EP2201196-001	SS10_0	EG005T: Arsenic	7440-38-2	50 mg/kg	90.6	70.0	130
		EG005T: Cadmium	7440-43-9	12.5 mg/kg	99.2	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	102	70.0	130
		EG005T: Copper	7440-50-8	50 mg/kg	106	70.0	130
		EG005T: Lead	7439-92-1	50 mg/kg	99.1	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	97.4	70.0	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4159670) - continued							
EP2201196-001	SS10_0	EG005T: Zinc	7440-66-6	50 mg/kg	87.6	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4159671)							
EP2201196-001	SS10_0	EG035T: Mercury	7439-97-6	1 mg/kg	85.7	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4153399)							
EP2201196-021	SS2_1.0	EP066: Total Polychlorinated biphenyls	----	0.5 mg/kg	82.0	43.1	142
EP068A: Organochlorine Pesticides (OC) (QCLot: 4153397)							
EP2201196-021	SS2_1.0	EP068: gamma-BHC	58-89-9	0.5 mg/kg	87.7	57.9	124
		EP068: Heptachlor	76-44-8	0.5 mg/kg	81.8	57.4	135
		EP068: Aldrin	309-00-2	0.5 mg/kg	88.3	59.6	125
		EP068: Dieldrin	60-57-1	0.5 mg/kg	77.1	62.2	131
		EP068: Endrin	72-20-8	0.5 mg/kg	87.5	55.8	138
		EP068: 4.4`-DDT	50-29-3	0.5 mg/kg	56.0	50.5	145
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4153397)							
EP2201196-021	SS2_1.0	EP068: Diazinon	333-41-5	0.5 mg/kg	101	59.5	128
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	94.5	60.3	128
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	66.2	58.8	127
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	61.3	60.7	128
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	90.2	60.0	129
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4153398)							
EP2201196-021	SS2_1.0	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	120	73.5	125
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	116	70.8	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4153396)							
EP2200977-002	Anonymous	EP071: C10 - C14 Fraction	----	1468 mg/kg	83.3	64.7	126
		EP071: C15 - C28 Fraction	----	3111 mg/kg	90.0	61.7	124
		EP071: C29 - C36 Fraction	----	436 mg/kg	95.4	64.6	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4153400)							
EP2200977-002	Anonymous	EP080: C6 - C9 Fraction	----	24 mg/kg	97.1	69.1	135
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4153396)							
EP2200977-002	Anonymous	EP071: >C10 - C16 Fraction	----	2234 mg/kg	85.4	64.7	126
		EP071: >C16 - C34 Fraction	----	2553 mg/kg	93.5	61.7	124
		EP071: >C34 - C40 Fraction	----	150 mg/kg	87.3	64.6	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4153400)							
EP2200977-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	29 mg/kg	85.6	69.1	135
EP080: BTEXN (QCLot: 4153400)							
EP2200977-002	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	77.6	76.4	118

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP080: BTEXN (QCLot: 4153400) - continued							
EP2200977-002	Anonymous	EP080: Toluene	108-88-3	2 mg/kg	86.2	67.4	112
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4157855)							
EP2201196-019	SS2_0	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	90.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	79.6	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	80.4	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	84.8	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	87.2	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	98.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4157855)							
EP2201196-019	SS2_0	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	93.4	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	83.2	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	104	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	89.6	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	95.6	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	90.4	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	90.8	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	110	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	99.6	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	108	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	102	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4157855)							
EP2201196-019	SS2_0	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	94.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	98.4	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	101	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	98.2	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	105	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	92.8	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	82.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4157855)							
EP2201196-019	SS2_0	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	96.8	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	95.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	99.2	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	118	69.2	143

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EG020T: Total Metals by ICP-MS (QCLot: 4154709)							
EP2201196-032	SW5	EG020A-T: Arsenic	7440-38-2	1 mg/L	121	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	114	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	107	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	102	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	106	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	116	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	116	70.0	130
EG035T: Total Mercury by FIMS (QCLot: 4154713)							
EP2201202-004	Anonymous	EG035T-LL: Mercury	7439-97-6	0.01 mg/L	90.0	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4154714)							
EP2201203-001	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	72.9	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4153472)							
EP2201196-031	SW4	EK055G: Ammonia as N	7664-41-7	1 mg/L	114	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4153466)							
EP2201205-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	99.8	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4153473)							
EP2201196-031	SW4	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	77.6	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4154958)							
EP2201053-009	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	108	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4154957)							
EP2201053-009	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	101	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4154314)							
EP2201059-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	95.9	77.0	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4154314)							
EP2201059-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	81.2	77.0	137
EP080: BTEXN (QCLot: 4154314)							
EP2201059-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	106	77.0	122
		EP080: Toluene	108-88-3	20 µg/L	101	73.5	126
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4156437)							
ES2203001-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	96.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	90.4	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	88.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	85.0	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	91.8	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	85.8	53.0	142

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4156437)							
ES2203001-003	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	99.9	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	103	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	121	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	111	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	105	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	110	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	121	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	114	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	87.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	77.6	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	106	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4156437)							
ES2203001-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	96.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	97.9	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	102	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	97.4	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	116	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	91.2	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	98.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4156437)							
ES2203001-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	87.0	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	99.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	113	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	82.2	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201196**	Page	: 1 of 16
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman PSI	Date Samples Received	: 02-Feb-2022
Site	: ----	Issue Date	: 09-Feb-2022
Sampler	: SANJANA AUDIT	No. of samples received	: 42
Order number	: ----	No. of samples analysed	: 26

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EP080/071: Total Petroleum Hydrocarbons	EP2201159--001	Anonymous	**C15 - C28 Fraction**	----	56.4 %	0% - 20%	**RPD exceeds LOR based limits**
EP080/071: Total Petroleum Hydrocarbons	EP2201159--001	Anonymous	**C29 - C36 Fraction**	----	75.8 %	0% - 50%	**RPD exceeds LOR based limits**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	EP2201159--001	Anonymous	**>C16 - C34 Fraction**	----	61.6 %	0% - 20%	**RPD exceeds LOR based limits**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK055G: Ammonia as N by Discrete Analyser						
Clear Plastic Bottle - Natural SW4, SW5, QC36	----	----	----	03-Feb-2022	30-Jan-2022	**4**
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural SW4, SW5, QC36	----	----	----	03-Feb-2022	31-Jan-2022	**3**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser						
Clear Plastic Bottle - Natural SW4, SW5, QC36	----	----	----	03-Feb-2022	31-Jan-2022	**3**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser						
Clear Plastic Bottle - Natural SW4, SW5, QC36	07-Feb-2022	30-Jan-2022	**8**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser						
Clear Plastic Bottle - Natural SW4, SW5, QC36	07-Feb-2022	31-Jan-2022	**7**	----	----	----

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	17	5.88	10.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	4	0.00	10.00	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP) - Continued					
TRH - Semivolatile Fraction	1	17	5.88	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Ethanolamines by LCMSMS	0	4	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	4	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	17	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*		*Sample Date*	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
SS10_0,	SS10_0.5,	**29-Jan-2022**	**----**	----	----	**08-Feb-2022**	12-Feb-2022	✓
SS8_0,	SS8_0.5,							
SS7_0,	SS7_0.5,							
SS6_0,	SS6_0.5,							
SS5_0,	SS5_0.5,							
SS2_0,	SS2_1.0,							
SS3_0,	SS3_0.5,							
SS4_0,	SS4_0.5,							
SS1_0,	SS1_0.5,							
QC32,	QC34							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Snap Lock Bag - ACM/Asbestos Grab Bag (EA200)								
SS10_0,	SS10_0.5,	**29-Jan-2022**	**----**	----	----	**04-Feb-2022**	28-Jul-2022	✓
SS8_0,	SS8_0.5,							
SS7_0,	SS7_0.5,							
SS6_0,	SS6_0.5,							
SS5_0,	SS5_0.5,							
SS2_0,	SS3_0,							
SS3_0.5,	SS4_0,							
SS4_0.5,	SS1_0,							
SS1_0.5								
Soil Glass Jar - Unpreserved (EA200)								
SS2_1.0		**29-Jan-2022**	**----**	----	----	**04-Feb-2022**	28-Jul-2022	✓
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
SS10_0,	SS10_0.5,	**29-Jan-2022**	**08-Feb-2022**	28-Jul-2022	✓	**08-Feb-2022**	28-Jul-2022	✓
SS8_0,	SS8_0.5,							
SS7_0,	SS7_0.5,							
SS6_0,	SS6_0.5,							
SS5_0,	SS5_0.5,							
SS2_0,	SS2_1.0,							
SS3_0,	SS3_0.5,							
SS4_0,	SS4_0.5,							
SS1_0,	SS1_0.5,							
QC32,	QC34							
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
SS10_0,	SS10_0.5,	**29-Jan-2022**	**08-Feb-2022**	26-Feb-2022	✓	**08-Feb-2022**	26-Feb-2022	✓
SS8_0,	SS8_0.5,							
SS7_0,	SS7_0.5,							
SS6_0,	SS6_0.5,							
SS5_0,	SS5_0.5,							
SS2_0,	SS2_1.0,							
SS3_0,	SS3_0.5,							
SS4_0,	SS4_0.5,							
SS1_0,	SS1_0.5,							
QC32,	QC34							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066) SS2_0, SS2_1.0, SS3_0, SS3_0.5, SS4_0, SS4_0.5, SS1_0, SS1_0.5, QC34	**29-Jan-2022**	**04-Feb-2022**	12-Feb-2022	✓	**08-Feb-2022**	16-Mar-2022	✓
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068) SS2_0, SS2_1.0, SS3_0, SS3_0.5, SS4_0, SS4_0.5, SS1_0, SS1_0.5, QC34	**29-Jan-2022**	**04-Feb-2022**	12-Feb-2022	✓	**08-Feb-2022**	16-Mar-2022	✓
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068) SS2_0, SS2_1.0, SS3_0, SS3_0.5, SS4_0, SS4_0.5, SS1_0, SS1_0.5, QC34	**29-Jan-2022**	**04-Feb-2022**	12-Feb-2022	✓	**08-Feb-2022**	16-Mar-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) SS2_0, SS2_1.0, SS3_0, SS3_0.5, SS4_0, SS4_0.5, SS1_0, SS1_0.5, QC34	**29-Jan-2022**	**04-Feb-2022**	12-Feb-2022	✓	**08-Feb-2022**	16-Mar-2022	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) SS2_0, SS2_1.0, SS3_0, SS3_0.5, SS4_0, SS4_0.5, SS1_0, SS1_0.5, QC34	**29-Jan-2022**	**04-Feb-2022**	12-Feb-2022	✓	**07-Feb-2022**	12-Feb-2022	✓
Soil Glass Jar - Unpreserved (EP071) SS2_0, SS2_1.0, SS3_0, SS3_0.5, SS4_0, SS4_0.5, SS1_0, SS1_0.5, QC34	**29-Jan-2022**	**04-Feb-2022**	12-Feb-2022	✓	**08-Feb-2022**	16-Mar-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) SS2_0, SS2_1.0, SS3_0, SS3_0.5, SS4_0, SS4_0.5, SS1_0, SS1_0.5, QC34	**29-Jan-2022**	**04-Feb-2022**	12-Feb-2022	✓	**07-Feb-2022**	12-Feb-2022	✓
Soil Glass Jar - Unpreserved (EP071) SS2_0, SS2_1.0, SS3_0, SS3_0.5, SS4_0, SS4_0.5, SS1_0, SS1_0.5, QC34	**29-Jan-2022**	**04-Feb-2022**	12-Feb-2022	✓	**08-Feb-2022**	16-Mar-2022	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) SS2_0, SS2_1.0, SS3_0, SS3_0.5, SS4_0, SS4_0.5, SS1_0, SS1_0.5, QC34	**29-Jan-2022**	**04-Feb-2022**	12-Feb-2022	✓	**07-Feb-2022**	12-Feb-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) SS2_0, SS2_1.0, SS3_0, SS3_0.5, SS4_0, SS4_0.5, SS1_0, SS1_0.5, QC34	**29-Jan-2022**	**07-Feb-2022**	28-Jul-2022	✓	**08-Feb-2022**	19-Mar-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) SS2_0, SS2_1.0, SS3_0, SS3_0.5, SS4_0, SS4_0.5, SS1_0, SS1_0.5, QC34	**29-Jan-2022**	**07-Feb-2022**	28-Jul-2022	✓	**08-Feb-2022**	19-Mar-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) SS2_0, SS2_1.0, SS3_0, SS3_0.5, SS4_0, SS4_0.5, SS1_0, SS1_0.5, QC34	**29-Jan-2022**	**07-Feb-2022**	28-Jul-2022	✓	**08-Feb-2022**	19-Mar-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) SS2_0, SS2_1.0, SS3_0, SS3_0.5, SS4_0, SS4_0.5, SS1_0, SS1_0.5, QC34	**29-Jan-2022**	**07-Feb-2022**	28-Jul-2022	✓	**08-Feb-2022**	19-Mar-2022	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) SS2_0, SS2_1.0, SS3_0, SS3_0.5, SS4_0, SS4_0.5, SS1_0, SS1_0.5, QC34	**29-Jan-2022**	**07-Feb-2022**	28-Jul-2022	✓	**08-Feb-2022**	19-Mar-2022	✓

Matrix: **SOLID**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples							
Snap Lock Bag - Friable Asbestos/PSD Bag (EA200) SS1_OH	**29-Jan-2022**	**----**	----	----	**04-Feb-2022**	28-Jul-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020A-T) QC39	**29-Jan-2022**	**04-Feb-2022**	28-Jul-2022	✓	**04-Feb-2022**	28-Jul-2022	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) SW4, SW5, QC36	**29-Jan-2022**	**04-Feb-2022**	28-Jul-2022	✓	**04-Feb-2022**	28-Jul-2022	✓
EG035T: Total Mercury by FIMS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG035T-LL) SW4, SW5, QC36	**29-Jan-2022**	**----**	----	----	**04-Feb-2022**	26-Feb-2022	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG035T) QC39	**29-Jan-2022**	**----**	----	----	**04-Feb-2022**	26-Feb-2022	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK055G) SW4, SW5, QC36	**29-Jan-2022**	**----**	----	----	**03-Feb-2022**	30-Jan-2022	✗

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) SW4, SW5, QC36	**29-Jan-2022**	**----**	----	----	**03-Feb-2022**	31-Jan-2022	×
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Natural (EK059G) SW4, SW5, QC36	**29-Jan-2022**	**----**	----	----	**03-Feb-2022**	31-Jan-2022	×
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Natural (EK061G) SW4, SW5, QC36	**29-Jan-2022**	**07-Feb-2022**	30-Jan-2022	×	**07-Feb-2022**	07-Mar-2022	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Natural (EK067G) SW4, SW5, QC36	**29-Jan-2022**	**07-Feb-2022**	31-Jan-2022	×	**07-Feb-2022**	07-Mar-2022	✓
EP066: Polychlorinated Biphenyls (PCB)							
Amber Glass Bottle - Unpreserved (EP066) SW4, SW5, QC36, QC39	**29-Jan-2022**	**04-Feb-2022**	05-Feb-2022	✓	**08-Feb-2022**	16-Mar-2022	✓
EP068A: Organochlorine Pesticides (OC)							
Amber Glass Bottle - Unpreserved (EP068) QC39	**29-Jan-2022**	**04-Feb-2022**	05-Feb-2022	✓	**08-Feb-2022**	16-Mar-2022	✓
EP068B: Organophosphorus Pesticides (OP)							
Amber Glass Bottle - Unpreserved (EP068) QC39	**29-Jan-2022**	**04-Feb-2022**	05-Feb-2022	✓	**08-Feb-2022**	16-Mar-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) QC39	**29-Jan-2022**	**04-Feb-2022**	05-Feb-2022	✓	**08-Feb-2022**	16-Mar-2022	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) QC38, QC39	**29-Jan-2022**	**04-Feb-2022**	05-Feb-2022	✓	**07-Feb-2022**	16-Mar-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC38, QC39	**29-Jan-2022**	**04-Feb-2022**	12-Feb-2022	✓	**04-Feb-2022**	12-Feb-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) QC38, QC39	**29-Jan-2022**	**04-Feb-2022**	05-Feb-2022	✓	**07-Feb-2022**	16-Mar-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC38, QC39	**29-Jan-2022**	**04-Feb-2022**	12-Feb-2022	✓	**04-Feb-2022**	12-Feb-2022	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) QC38, QC39	**29-Jan-2022**	**04-Feb-2022**	12-Feb-2022	✓	**04-Feb-2022**	12-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
SW4, SW5, QC36, QC39	**29-Jan-2022**	**07-Feb-2022**	28-Jul-2022	✓	**07-Feb-2022**	28-Jul-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
SW4, SW5, QC36, QC39	**29-Jan-2022**	**07-Feb-2022**	28-Jul-2022	✓	**07-Feb-2022**	28-Jul-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
SW4, SW5, QC36, QC39	**29-Jan-2022**	**07-Feb-2022**	28-Jul-2022	✓	**07-Feb-2022**	28-Jul-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
SW4, SW5, QC36, QC39	**29-Jan-2022**	**07-Feb-2022**	28-Jul-2022	✓	**07-Feb-2022**	28-Jul-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
SW4, SW5, QC36, QC39	**29-Jan-2022**	**07-Feb-2022**	28-Jul-2022	✓	**07-Feb-2022**	28-Jul-2022	✓
EP262: Ethanolamines							
Amber Bottle Unpreserved for Specialist Organics (EP262)							
SW4, SW5, QC36, QC39	**29-Jan-2022**	**----**	----	----	**04-Feb-2022**	05-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	3	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	4	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS - Low Level	EG035T-LL	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS - Low Level	EG035T-LL	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS - Low Level	EG035T-LL	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	0	4	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	4	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS - Low Level	EG035T-LL	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	17	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Asbestos Identification in Bulk Solids	EA200	SOLID	In house: Referenced to AS 4964 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining

Analytical Methods	Method	Matrix	Method Descriptions
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS - Low Level	EG035T-LL	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is concentrated, combined with an equal volume of reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines by LCMSMS	EP262	WATER	In house: LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201691**	Page	: 1 of 31
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 724-PEREN295751 PERDAMAN	Date Samples Received	: 14-Feb-2022 13:40
Order number	: ----	Date Analysis Commenced	: 14-Feb-2022
C-O-C number	: ----	Issue Date	: 22-Feb-2022 14:55
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 19		
No. of samples analysed	: 19		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X and EP262 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP262 :Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.
- EP262: Matrix spike recovery not determined due to dilution requirement.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG035F-LL: LOR raised for Hg on sample 005, 009, 014 and 019 due to high TDS content.
- EG020: Metals LOR for sample EP2201691 -005,-009,-14, -018 and -019 raised due to high TDS content.
- EP262: ALS is not NATA accredited for the analysis of MDEA.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW01	MW04	MW05	MW06	MW08
			Sampling date / time	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-001	EP2201691-002	EP2201691-003	EP2201691-004	EP2201691-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.52	----	----	----	7.50
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	12500	----	----	----	162000
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	7800	----	----	----	139000
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	463	----	----	----	131
Total Alkalinity as CaCO3	----	1	mg/L	463	----	----	----	131
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	53	----	----	----	45
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	14	----	----	----	8050
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	3860	----	----	----	70700
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	350	----	----	----	1500
Magnesium	7439-95-4	1	mg/L	335	----	----	----	4870
Sodium	7440-23-5	1	mg/L	1740	----	----	----	42500
Potassium	7440-09-7	1	mg/L	25	----	----	----	1540
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	----	----	----	<0.20
Arsenic	7440-38-2	0.001	mg/L	0.005	----	0.003	0.001	<0.020
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	<0.0001	0.0002	<0.0020
Chromium	7440-47-3	0.001	mg/L	<0.001	----	<0.001	<0.001	<0.020
Copper	7440-50-8	0.001	mg/L	<0.001	----	<0.001	<0.001	<0.020
Nickel	7440-02-0	0.001	mg/L	0.003	----	0.003	0.005	<0.020
Lead	7439-92-1	0.001	mg/L	<0.001	----	<0.001	<0.001	<0.020
Zinc	7440-66-6	0.005	mg/L	<0.005	----	<0.005	0.035	<0.100
Manganese	7439-96-5	0.001	mg/L	17.4	----	----	----	0.390
Iron	7439-89-6	0.05	mg/L	15.8	----	----	----	<1.00
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	<0.00004	----	<0.00004	<0.00004	<0.00020

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW01	MW04	MW05	MW06	MW08
			Sampling date / time	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-001	EP2201691-002	EP2201691-003	EP2201691-004	EP2201691-005
				Result	Result	Result	Result	Result
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	----	<0.01	9.19	0.74
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	----	----	<0.01	0.63	0.06
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	----	----	<0.01	0.20	5.48
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	<0.01	0.83	5.54
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	0.5	11.1	4.0
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	----	----	0.5	11.9	9.5
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	----	----	0.08	0.06	0.85
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	118	----	----	----	2160
ø Total Cations	----	0.01	meq/L	121	----	----	----	2360
ø Ionic Balance	----	0.01	%	1.22	----	----	----	4.40
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	----	<1	<1	<1	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	----	<0.5	<0.5	<0.5	----
beta-BHC	319-85-7	0.5	µg/L	----	<0.5	<0.5	<0.5	----
gamma-BHC	58-89-9	0.5	µg/L	----	<0.5	<0.5	<0.5	----
delta-BHC	319-86-8	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Heptachlor	76-44-8	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Aldrin	309-00-2	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	----	<0.5	<0.5	<0.5	----
trans-Chlordane	5103-74-2	0.5	µg/L	----	<0.5	<0.5	<0.5	----
alpha-Endosulfan	959-98-8	0.5	µg/L	----	<0.5	<0.5	<0.5	----
cis-Chlordane	5103-71-9	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Dieldrin	60-57-1	0.5	µg/L	----	<0.5	<0.5	<0.5	----
4.4`-DDE	72-55-9	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Endrin	72-20-8	0.5	µg/L	----	<0.5	<0.5	<0.5	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW01	MW04	MW05	MW06	MW08
			Sampling date / time	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-001	EP2201691-002	EP2201691-003	EP2201691-004	EP2201691-005
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-Endosulfan	33213-65-9	0.5	µg/L	----	<0.5	<0.5	<0.5	----
4.4`-DDD	72-54-8	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Endrin aldehyde	7421-93-4	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	----	<0.5	<0.5	<0.5	----
4.4`-DDT	50-29-3	2.0	µg/L	----	<2.0	<2.0	<2.0	----
Endrin ketone	53494-70-5	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Methoxychlor	72-43-5	2.0	µg/L	----	<2.0	<2.0	<2.0	----
^ Total Chlordane (sum)	----	0.5	µg/L	----	<0.5	<0.5	<0.5	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	----	<0.5	<0.5	<0.5	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	----	<0.5	<0.5	<0.5	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Demeton-S-methyl	919-86-8	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Monocrotophos	6923-22-4	2.0	µg/L	----	<2.0	<2.0	<2.0	----
Dimethoate	60-51-5	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Diazinon	333-41-5	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Parathion-methyl	298-00-0	2.0	µg/L	----	<2.0	<2.0	<2.0	----
Malathion	121-75-5	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Fenthion	55-38-9	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Chlorpyrifos	2921-88-2	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Parathion	56-38-2	2.0	µg/L	----	<2.0	<2.0	<2.0	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Chlorfenvinphos	470-90-6	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Fenamiphos	22224-92-6	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Prothiofos	34643-46-4	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Ethion	563-12-2	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Carbophenothion	786-19-6	0.5	µg/L	----	<0.5	<0.5	<0.5	----
Azinphos Methyl	86-50-0	0.5	µg/L	----	<0.5	<0.5	<0.5	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	----	----	<1.0	<1.0	<1.0

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW01	MW04	MW05	MW06	MW08
			Sampling date / time	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-001	EP2201691-002	EP2201691-003	EP2201691-004	EP2201691-005
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	----	----	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	----	----	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	----	----	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	----	----	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	----	----	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	----	----	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	----	----	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	----	----	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	----	----	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	----	----	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	----	----	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	----	----	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	----	----	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	----	----	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	----	----	<100	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	----	----	<1	<1	<1
Toluene	108-88-3	2	µg/L	----	----	<2	<2	<2

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW01	MW04	MW05	MW06	MW08
			Sampling date / time	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-001	EP2201691-002	EP2201691-003	EP2201691-004	EP2201691-005
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
Ethylbenzene	100-41-4	2	µg/L	----	----	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	----	----	<2	<2	<2
^ Total Xylenes	----	2	µg/L	----	----	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	----	----	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	----	----	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	**0.0101**	----	<0.0005	<0.0005	**0.0057**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	----	**0.0011**	**0.0006**	**0.0024**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	**0.0044**	----	**0.0045**	**0.0033**	**0.0013**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	----	<0.0020	**0.0435**	**0.0383**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	----	**0.0012**	<0.0005	**0.0603**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	----	**0.0018**	**0.0010**	**0.0239**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	----	**0.0038**	**0.0019**	**0.0349**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	**0.0023**	----	**0.0028**	**0.0102**	**0.0048**
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	**0.0007**	----	**0.0027**	**0.0052**	**0.0015**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	----	**0.0012**	**0.0038**	<0.0005
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	----	<0.0005	**0.0006**	<0.0005
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW01	MW04	MW05	MW06	MW08
			Sampling date / time	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-001	EP2201691-002	EP2201691-003	EP2201691-004	EP2201691-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	----	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	----	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	----	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	----	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	----	<0.0005	<0.0005	<0.0005
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	----	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	**0.004**	----	**0.007**	**0.005**	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	**0.001**	----	<0.001	**0.001**	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	----	<0.001	<0.001	<0.001
EP231P: PFAS Sums								
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	**0.0044**	----	**0.0056**	**0.0039**	**0.0037**
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	**0.0218**	----	**0.0222**	**0.0665**	**0.172**
^ Sum of PFAS	----	0.0002	µg/L	**0.0225**	----	**0.0261**	**0.0761**	**0.173**
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	----	----	----	----	<10
Diethanolamine	111-42-2	1	µg/L	----	----	----	----	<10
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	----	----	----	----	<10
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW01	MW04	MW05	MW06	MW08
			Sampling date / time	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-001	EP2201691-002	EP2201691-003	EP2201691-004	EP2201691-005
				Result	Result	Result	Result	Result
EP066S: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	1	%	----	57.4	48.8	73.9	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	----	78.8	144	97.0	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	----	63.2	88.4	83.8	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	----	----	34.3	29.4	54.6
2-Chlorophenol-D4	93951-73-6	1.0	%	----	----	75.4	66.0	78.2
2.4.6-Tribromophenol	118-79-6	1.0	%	----	----	55.2	60.7	114
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	----	----	86.5	74.8	85.0
Anthracene-d10	1719-06-8	1.0	%	----	----	112	85.6	98.5
4-Terphenyl-d14	1718-51-0	1.0	%	----	----	109	84.8	112
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	----	----	95.3	113	98.9
Toluene-D8	2037-26-5	2	%	----	----	106	99.0	103
4-Bromofluorobenzene	460-00-4	2	%	----	----	107	118	113
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	96.3	----	98.4	94.7	95.1
13C8-PFOA	----	0.0005	%	119	----	101	118	106

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW010	BH22	BH31	BH12	QC01
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-006	EP2201691-007	EP2201691-008	EP2201691-009	EP2201691-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.31	7.76	----	7.20	8.36
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	8930	6680	----	180000	9010
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	5160	4820	----	166000	5010
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	<1	8
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	344	563	----	105	340
Total Alkalinity as CaCO3	----	1	mg/L	344	563	----	105	348
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	<1	32	----	53	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	342	87	----	6500	339
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	2590	2060	----	84900	2570
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	30	169	----	1440	29
Magnesium	7439-95-4	1	mg/L	88	172	----	5260	89
Sodium	7440-23-5	1	mg/L	1690	1120	----	48400	1700
Potassium	7440-09-7	1	mg/L	94	53	----	1800	94
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.02	0.05	----	<0.20	0.02
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.004	0.002	<0.020	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0020	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.020	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.010	<0.020	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	0.004	0.028	<0.020	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.020	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	0.009	0.008	<0.100	<0.005
Manganese	7439-96-5	0.001	mg/L	<0.001	5.74	----	14.5	0.001
Iron	7439-89-6	0.05	mg/L	<0.05	5.39	----	8.39	<0.05
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	<0.00004	<0.00004	<0.00004	<0.00020	<0.00004

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW010	BH22	BH31	BH12	QC01
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-006	EP2201691-007	EP2201691-008	EP2201691-009	EP2201691-010
				Result	Result	Result	Result	Result
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	3.73	0.13	0.74	0.09
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	9.16	0.02	<0.01	<0.01	9.17
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	9.17	0.02	<0.01	<0.01	9.17
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.6	61.1	63.0	2.4	0.6
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	9.8	61.1	63.0	2.4	9.8
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.02	0.28	0.86	0.06	0.02
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	87.0	71.2	----	2530	86.5
ø Total Cations	----	0.01	meq/L	84.6	72.7	----	2660	85.1
ø Ionic Balance	----	0.01	%	1.40	1.04	----	2.38	0.81
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	----	----	<1	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	----	----	<0.5	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	----	----	<0.5	----	----
beta-BHC	319-85-7	0.5	µg/L	----	----	<0.5	----	----
gamma-BHC	58-89-9	0.5	µg/L	----	----	<0.5	----	----
delta-BHC	319-86-8	0.5	µg/L	----	----	<0.5	----	----
Heptachlor	76-44-8	0.5	µg/L	----	----	<0.5	----	----
Aldrin	309-00-2	0.5	µg/L	----	----	<0.5	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	----	----	<0.5	----	----
trans-Chlordane	5103-74-2	0.5	µg/L	----	----	<0.5	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L	----	----	<0.5	----	----
cis-Chlordane	5103-71-9	0.5	µg/L	----	----	<0.5	----	----
Dieldrin	60-57-1	0.5	µg/L	----	----	<0.5	----	----
4.4`-DDE	72-55-9	0.5	µg/L	----	----	<0.5	----	----
Endrin	72-20-8	0.5	µg/L	----	----	<0.5	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW010	BH22	BH31	BH12	QC01
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-006	EP2201691-007	EP2201691-008	EP2201691-009	EP2201691-010
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-Endosulfan	33213-65-9	0.5	µg/L	----	----	<0.5	----	----
4.4`-DDD	72-54-8	0.5	µg/L	----	----	<0.5	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	----	----	<0.5	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	----	----	<0.5	----	----
4.4`-DDT	50-29-3	2.0	µg/L	----	----	<2.0	----	----
Endrin ketone	53494-70-5	0.5	µg/L	----	----	<0.5	----	----
Methoxychlor	72-43-5	2.0	µg/L	----	----	<2.0	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	----	----	<0.5	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	----	----	<0.5	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	----	----	<0.5	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	----	----	<0.5	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	----	----	<0.5	----	----
Monocrotophos	6923-22-4	2.0	µg/L	----	----	<2.0	----	----
Dimethoate	60-51-5	0.5	µg/L	----	----	<0.5	----	----
Diazinon	333-41-5	0.5	µg/L	----	----	<0.5	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	----	----	<0.5	----	----
Parathion-methyl	298-00-0	2.0	µg/L	----	----	<2.0	----	----
Malathion	121-75-5	0.5	µg/L	----	----	<0.5	----	----
Fenthion	55-38-9	0.5	µg/L	----	----	<0.5	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	----	----	<0.5	----	----
Parathion	56-38-2	2.0	µg/L	----	----	<2.0	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	----	----	<0.5	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	----	----	<0.5	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	----	----	<0.5	----	----
Fenamiphos	22224-92-6	0.5	µg/L	----	----	<0.5	----	----
Prothiofos	34643-46-4	0.5	µg/L	----	----	<0.5	----	----
Ethion	563-12-2	0.5	µg/L	----	----	<0.5	----	----
Carbophenothion	786-19-6	0.5	µg/L	----	----	<0.5	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	----	----	<0.5	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW010	BH22	BH31	BH12	QC01
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-006	EP2201691-007	EP2201691-008	EP2201691-009	EP2201691-010
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	**50**	**9220**	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	**240**	**2940**	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	**290**	**12200**	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	**11600**	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	**220**	**270**	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	**220**	**11900**	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	**11600**	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW010	BH22	BH31	BH12	QC01
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-006	EP2201691-007	EP2201691-008	EP2201691-009	EP2201691-010
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	**0.0113**	**0.0416**	**0.512**	**0.0188**	**0.0114**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	**0.368**	**0.256**	**0.0086**	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	**0.0011**	**2.37**	**1.29**	**0.126**	**0.0011**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	**0.0614**	**0.0720**	**0.0039**	<0.0005
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	**0.0017**	**0.726**	**0.595**	**0.0898**	**0.0016**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	**0.0752**	**0.207**	**0.0768**	**0.0143**	**0.0782**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	**0.140**	**0.425**	**0.346**	**0.0180**	**0.142**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	**0.137**	**0.271**	**0.209**	**0.0095**	**0.138**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	**0.122**	**0.933**	**0.839**	**0.0296**	**0.112**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	**0.0734**	**0.232**	**0.186**	**0.0108**	**0.0712**
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	**0.0226**	**0.0131**	**0.0098**	**0.0012**	**0.0210**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	**0.0006**	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW010	BH22	BH31	BH12	QC01
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-006	EP2201691-007	EP2201691-008	EP2201691-009	EP2201691-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	**0.0006**	<0.0005	<0.0005	<0.0005
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	**0.002**	**0.002**	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	**0.432**	**0.464**	**0.025**	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	**0.003**	**0.005**	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
EP231P: PFAS Sums								
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	**0.0028**	**3.10**	**1.88**	**0.216**	**0.0027**
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	**0.562**	**5.64**	**4.52**	**0.342**	**0.556**
^ Sum of PFAS	----	0.0002	µg/L	**0.584**	**6.09**	**4.86**	**0.356**	**0.576**
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<10	<10	----	<10	<10
Diethanolamine	111-42-2	1	µg/L	<10	<10	----	<10	<10
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<10	<10	----	<10	<10
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW010	BH22	BH31	BH12	QC01
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-006	EP2201691-007	EP2201691-008	EP2201691-009	EP2201691-010
				Result	Result	Result	Result	Result
EP066S: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	1	%	----	----	63.3	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	----	----	111	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	----	----	39.7	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	31.3	26.3	35.8	53.7	23.8
2-Chlorophenol-D4	93951-73-6	1.0	%	69.2	58.8	82.0	72.0	51.8
2.4.6-Tribromophenol	118-79-6	1.0	%	57.9	120	131	105	40.1
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	77.1	71.4	60.9	76.2	59.2
Anthracene-d10	1719-06-8	1.0	%	95.5	92.2	93.3	89.3	73.9
4-Terphenyl-d14	1718-51-0	1.0	%	100	87.9	82.1	94.1	80.8
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	79.9	96.3	95.5	97.7	92.3
Toluene-D8	2037-26-5	2	%	104	88.2	95.2	98.1	96.4
4-Bromofluorobenzene	460-00-4	2	%	112	113	112	110	110
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	99.7	67.3	96.0	113	97.7
13C8-PFOA	----	0.0005	%	102	113	106	114	104

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC03	QC04	QC05	QC06	QC08
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-011	EP2201691-012	EP2201691-013	EP2201691-014	EP2201691-015
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	----	----	----	**7.52**	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	----	----	**145000**	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	**130000**	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	----	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	----	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	----	**120**	----
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	**120**	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	----	----	----	**35**	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	**7740**	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	----	----	----	**68800**	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	----	----	**1460**	----
Magnesium	7439-95-4	1	mg/L	----	----	----	**4530**	----
Sodium	7440-23-5	1	mg/L	----	----	----	**39800**	----
Potassium	7440-09-7	1	mg/L	----	----	----	**1460**	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	----	----	----	<0.20	----
Arsenic	7440-38-2	0.001	mg/L	----	----	----	<0.020	----
Cadmium	7440-43-9	0.0001	mg/L	----	----	----	<0.0020	----
Chromium	7440-47-3	0.001	mg/L	----	----	----	<0.020	----
Copper	7440-50-8	0.001	mg/L	----	----	----	<0.020	----
Nickel	7440-02-0	0.001	mg/L	----	----	----	<0.020	----
Lead	7439-92-1	0.001	mg/L	----	----	----	<0.020	----
Zinc	7440-66-6	0.005	mg/L	----	----	----	<0.100	----
Manganese	7439-96-5	0.001	mg/L	----	----	----	**0.069**	----
Iron	7439-89-6	0.05	mg/L	----	----	----	<1.00	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	----	----	----	<0.00020	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC03	QC04	QC05	QC06	QC08
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-011	EP2201691-012	EP2201691-013	EP2201691-014	EP2201691-015
				Result	Result	Result	Result	Result
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	----	----	0.55	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	----	----	----	0.02	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	----	----	----	6.20	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	----	6.22	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	----	2.0	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	----	----	----	8.2	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	----	----	----	0.08	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	----	----	----	2100	----
ø Total Cations	----	0.01	meq/L	----	----	----	2210	----
ø Ionic Balance	----	0.01	%	----	----	----	2.54	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	----	----	<1	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	----	----	<0.5	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	----	----	<0.5	----	----
beta-BHC	319-85-7	0.5	µg/L	----	----	<0.5	----	----
gamma-BHC	58-89-9	0.5	µg/L	----	----	<0.5	----	----
delta-BHC	319-86-8	0.5	µg/L	----	----	<0.5	----	----
Heptachlor	76-44-8	0.5	µg/L	----	----	<0.5	----	----
Aldrin	309-00-2	0.5	µg/L	----	----	<0.5	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	----	----	<0.5	----	----
trans-Chlordane	5103-74-2	0.5	µg/L	----	----	<0.5	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L	----	----	<0.5	----	----
cis-Chlordane	5103-71-9	0.5	µg/L	----	----	<0.5	----	----
Dieldrin	60-57-1	0.5	µg/L	----	----	<0.5	----	----
4.4`-DDE	72-55-9	0.5	µg/L	----	----	<0.5	----	----
Endrin	72-20-8	0.5	µg/L	----	----	<0.5	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC03	QC04	QC05	QC06	QC08
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-011	EP2201691-012	EP2201691-013	EP2201691-014	EP2201691-015
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-Endosulfan	33213-65-9	0.5	µg/L	----	----	<0.5	----	----
4.4`-DDD	72-54-8	0.5	µg/L	----	----	<0.5	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	----	----	<0.5	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	----	----	<0.5	----	----
4.4`-DDT	50-29-3	2.0	µg/L	----	----	<2.0	----	----
Endrin ketone	53494-70-5	0.5	µg/L	----	----	<0.5	----	----
Methoxychlor	72-43-5	2.0	µg/L	----	----	<2.0	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	----	----	<0.5	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	----	----	<0.5	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	----	----	<0.5	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	----	----	<0.5	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	----	----	<0.5	----	----
Monocrotophos	6923-22-4	2.0	µg/L	----	----	<2.0	----	----
Dimethoate	60-51-5	0.5	µg/L	----	----	<0.5	----	----
Diazinon	333-41-5	0.5	µg/L	----	----	<0.5	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	----	----	<0.5	----	----
Parathion-methyl	298-00-0	2.0	µg/L	----	----	<2.0	----	----
Malathion	121-75-5	0.5	µg/L	----	----	<0.5	----	----
Fenthion	55-38-9	0.5	µg/L	----	----	<0.5	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	----	----	<0.5	----	----
Parathion	56-38-2	2.0	µg/L	----	----	<2.0	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	----	----	<0.5	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	----	----	<0.5	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	----	----	<0.5	----	----
Fenamiphos	22224-92-6	0.5	µg/L	----	----	<0.5	----	----
Prothiofos	34643-46-4	0.5	µg/L	----	----	<0.5	----	----
Ethion	563-12-2	0.5	µg/L	----	----	<0.5	----	----
Carbophenothion	786-19-6	0.5	µg/L	----	----	<0.5	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	----	----	<0.5	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC03	QC04	QC05	QC06	QC08
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-011	EP2201691-012	EP2201691-013	EP2201691-014	EP2201691-015
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	----	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	----	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	----	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	----	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	----	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	----	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	<100	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	----	<2	<2	<2

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC03	QC04	QC05	QC06	QC08
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-011	EP2201691-012	EP2201691-013	EP2201691-014	EP2201691-015
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
Ethylbenzene	100-41-4	2	µg/L	<2	----	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	----	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	----	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	----	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	----	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	----	<0.0005	<0.0005	**0.0015**	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	----	<0.0005	<0.0005	**0.0017**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	----	<0.0002	<0.0002	**0.0012**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	----	<0.0020	<0.0020	**0.0196**	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	----	<0.0005	<0.0005	**0.0411**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	----	<0.0005	<0.0005	**0.0071**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	----	<0.0005	<0.0005	**0.0170**	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	----	<0.0005	<0.0005	**0.0017**	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	----	<0.0005	<0.0005	**0.0009**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC03	QC04	QC05	QC06	QC08
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-011	EP2201691-012	EP2201691-013	EP2201691-014	EP2201691-015
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	----	<0.001	<0.001	<0.001	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	----	<0.001	<0.001	<0.001	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	----	<0.001	<0.001	<0.001	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	----	<0.001	<0.001	<0.001	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	----	<0.0005	<0.0005	<0.0005	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	----	<0.001	<0.001	<0.001	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	----	<0.001	<0.001	<0.001	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	----	<0.001	<0.001	<0.001	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	----	<0.001	<0.001	<0.001	----
EP231P: PFAS Sums								
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	----	<0.0002	<0.0002	**0.0029**	----
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	----	<0.0002	<0.0002	**0.0909**	----
^ Sum of PFAS	----	0.0002	µg/L	----	<0.0002	<0.0002	**0.0918**	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	----	----	<10	<10	----
Diethanolamine	111-42-2	1	µg/L	----	----	<10	<10	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	----	----	<10	<10	----
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC03	QC04	QC05	QC06	QC08
			Sampling date / time	09-Feb-2022 00:00	09-Feb-2022 00:00	09-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201691-011	EP2201691-012	EP2201691-013	EP2201691-014	EP2201691-015
				Result	Result	Result	Result	Result
EP066S: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	1	%	----	----	34.2	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	----	----	136	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	----	----	63.3	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	24.7	----	26.4	60.1	29.3
2-Chlorophenol-D4	93951-73-6	1.0	%	59.2	----	62.5	85.3	44.3
2.4.6-Tribromophenol	118-79-6	1.0	%	58.6	----	15.1	85.7	54.8
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	67.7	----	62.3	97.3	74.9
Anthracene-d10	1719-06-8	1.0	%	76.4	----	63.7	101	86.8
4-Terphenyl-d14	1718-51-0	1.0	%	76.2	----	59.1	101	88.3
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	96.3	----	94.9	91.5	95.7
Toluene-D8	2037-26-5	2	%	101	----	99.6	105	100
4-Bromofluorobenzene	460-00-4	2	%	112	----	109	107	110
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	----	94.5	99.1	93.7	----
13C8-PFOA	----	0.0005	%	----	101	93.2	97.8	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC09	TBW46	MW07-2	MW08-2	----
			Sampling date / time	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201691-016	EP2201691-017	EP2201691-018	EP2201691-019	--------
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	----	----	----	7.53	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	----	----	143000	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	143000	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	----	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	----	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	----	122	----
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	122	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	----	----	----	34	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	7670	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	----	----	----	67200	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	----	----	1500	----
Magnesium	7439-95-4	1	mg/L	----	----	----	4460	----
Sodium	7440-23-5	1	mg/L	----	----	----	40000	----
Potassium	7440-09-7	1	mg/L	----	----	----	1540	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	----	----	----	<0.20	----
Arsenic	7440-38-2	0.001	mg/L	----	----	<0.020	<0.020	----
Cadmium	7440-43-9	0.0001	mg/L	----	----	<0.0020	<0.0020	----
Chromium	7440-47-3	0.001	mg/L	----	----	<0.020	<0.020	----
Copper	7440-50-8	0.001	mg/L	----	----	<0.020	<0.020	----
Nickel	7440-02-0	0.001	mg/L	----	----	<0.020	<0.020	----
Lead	7439-92-1	0.001	mg/L	----	----	<0.020	<0.020	----
Zinc	7440-66-6	0.005	mg/L	----	----	<0.100	<0.100	----
Manganese	7439-96-5	0.001	mg/L	----	----	----	0.069	----
Iron	7439-89-6	0.05	mg/L	----	----	----	<1.00	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	----	----	<0.00004	<0.00020	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC09	TBW46	MW07-2	MW08-2	----
			Sampling date / time	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201691-016	EP2201691-017	EP2201691-018	EP2201691-019	--------
				Result	Result	Result	Result	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	----	----	0.55	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	----	----	----	0.03	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	----	----	----	6.13	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	----	6.16	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	----	2.2	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	----	----	----	8.4	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	----	----	----	0.10	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	----	----	----	2060	----
ø Total Cations	----	0.01	meq/L	----	----	----	2220	----
ø Ionic Balance	----	0.01	%	----	----	----	3.82	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	<1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	<0.5	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	----	----	----	----
beta-BHC	319-85-7	0.5	µg/L	<0.5	----	----	----	----
gamma-BHC	58-89-9	0.5	µg/L	<0.5	----	----	----	----
delta-BHC	319-86-8	0.5	µg/L	<0.5	----	----	----	----
Heptachlor	76-44-8	0.5	µg/L	<0.5	----	----	----	----
Aldrin	309-00-2	0.5	µg/L	<0.5	----	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	----	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	----	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	----	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	----	----	----	----
Dieldrin	60-57-1	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDE	72-55-9	0.5	µg/L	<0.5	----	----	----	----
Endrin	72-20-8	0.5	µg/L	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC09	TBW46	MW07-2	MW08-2	----
			Sampling date / time	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201691-016	EP2201691-017	EP2201691-018	EP2201691-019	--------
				Result	Result	Result	Result	----
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDD	72-54-8	0.5	µg/L	<0.5	----	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	----	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDT	50-29-3	2.0	µg/L	<2.0	----	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	----	----	----	----
Methoxychlor	72-43-5	2.0	µg/L	<2.0	----	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	<0.5	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	----	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	----	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	----	----	----	----
Dimethoate	60-51-5	0.5	µg/L	<0.5	----	----	----	----
Diazinon	333-41-5	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	----	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	----	----	----	----
Malathion	121-75-5	0.5	µg/L	<0.5	----	----	----	----
Fenthion	55-38-9	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	----	----	----	----
Parathion	56-38-2	2.0	µg/L	<2.0	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	----	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	----	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	----	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	----	----	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	----	----	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	----	----	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	----	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	<1.0	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	<1.0	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	<1.0	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC09	TBW46	MW07-2	MW08-2	----
			Sampling date / time	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201691-016	EP2201691-017	EP2201691-018	EP2201691-019	--------
				Result	Result	Result	Result	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	<1.0	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	<1.0	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	<1.0	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	<1.0	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	<1.0	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	<1.0	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	<1.0	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	<1.0	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	<0.5	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	<20	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	<50	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	<100	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	<20	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	<20	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	<100	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	<100	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	<100	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	<100	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	<1	----
Toluene	108-88-3	2	µg/L	<2	----	----	<2	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC09	TBW46	MW07-2	MW08-2	----
			Sampling date / time	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201691-016	EP2201691-017	EP2201691-018	EP2201691-019	--------
				Result	Result	Result	Result	----
EP080: BTEXN - Continued								
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	<2	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	<2	----
^ Total Xylenes	----	2	µg/L	<2	----	----	<2	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	<1	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	<5	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	**0.0011**	**0.0014**	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	**0.0006**	**0.0017**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	**0.0009**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	**0.0306**	**0.0171**	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	**0.0223**	**0.0250**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	**0.0064**	**0.0071**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	**0.0130**	**0.0132**	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	**0.0016**	**0.0013**	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC09	TBW46	MW07-2	MW08-2	----
			Sampling date / time	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201691-016	EP2201691-017	EP2201691-018	EP2201691-019	--------
				Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
EP231P: PFAS Sums								
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	<0.0002	**0.0006**	**0.0026**	----
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	**0.0756**	**0.0677**	----
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	**0.0756**	**0.0677**	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<10	----	<10	<10	----
Diethanolamine	111-42-2	1	µg/L	<10	----	<10	<10	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<10	----	<10	<10	----
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC09	TBW46	MW07-2	MW08-2	----
			Sampling date / time	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	10-Feb-2022 00:00	----
Compound	CAS Number	LOR	Unit	EP2201691-016	EP2201691-017	EP2201691-018	EP2201691-019	--------
				Result	Result	Result	Result	----
EP066S: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	1	%	72.1	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	88.5	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	53.4	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	52.1	----	----	45.0	----
2-Chlorophenol-D4	93951-73-6	1.0	%	50.2	----	----	75.8	----
2.4.6-Tribromophenol	118-79-6	1.0	%	61.8	----	----	121	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	64.0	----	----	99.4	----
Anthracene-d10	1719-06-8	1.0	%	90.7	----	----	99.0	----
4-Terphenyl-d14	1718-51-0	1.0	%	88.5	----	----	110	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	106	----	----	98.8	----
Toluene-D8	2037-26-5	2	%	99.3	----	----	111	----
4-Bromofluorobenzene	460-00-4	2	%	111	----	----	112	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	98.7	101	96.6	95.1	----
13C8-PFOA	----	0.0005	%	96.2	94.8	105	92.9	----

Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	27	136
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	50	146
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	27	153
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	67
2-Chlorophenol-D4	93951-73-6	29	120
2.4.6-Tribromophenol	118-79-6	10	131
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	34	131
Anthracene-d10	1719-06-8	43	126
4-Terphenyl-d14	1718-51-0	41	142
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

(WATER) EP262: Ethanolamines

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2201691**	Page	: 1 of 16
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 724-PEREN295751 PERDAMAN	Date Samples Received	: 14-Feb-2022
Order number	: ----	Date Analysis Commenced	: 14-Feb-2022
C-O-C number	: ----	Issue Date	: 22-Feb-2022
Sampler	: Nick Taylor		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 19		
No. of samples analysed	: 19		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 4174042)									
EP2201675-017	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.67	7.69	0.3	0% - 20%
EP2201675-027	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	9.05	9.09	0.4	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 4174045)									
EP2201691-009	BH12	EA005-P: pH Value	----	0.01	pH Unit	7.20	7.23	0.4	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4174043)									
EP2201675-017	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	59100	59500	0.6	0% - 20%
EP2201675-027	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	50000	49900	0.2	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4174046)									
EP2201691-009	BH12	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	180000	184000	1.9	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 4175700)									
EP2201486-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	334	334	0.3	0% - 20%
EP2201524-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	4950	4910	0.9	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 4175714)									
EP2201545-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	174	170	2.0	0% - 50%
EP2201592-007	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	485	514	5.9	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4174041)									
EP2201675-017	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	164	163	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	164	163	0.0	0% - 20%
EP2201675-027	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	81	86	6.3	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	16	14	17.8	0% - 50%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
ED037P: Alkalinity by PC Titrator (QC Lot: 4174041) - continued									
EP2201675-027	Anonymous	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	97	100	2.6	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4174044)									
EP2201691-009	BH12	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	105	95	10.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	105	95	10.6	0% - 20%
ED038A: Acidity (QC Lot: 4175730)									
EP2201666-001	Anonymous	ED038: Acidity as CaCO3	----	1	mg/L	5	6	0.0	No Limit
EP2201666-006	Anonymous	ED038: Acidity as CaCO3	----	1	mg/L	19	12	45.2	0% - 50%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4172297)									
EP2201691-006	MW010	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	342	341	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4177535)									
EP2201691-001	MW01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	14	14	0.0	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 4172296)									
EP2201691-006	MW010	ED045G: Chloride	16887-00-6	1	mg/L	2590	2550	1.3	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4177536)									
EP2201691-001	MW01	ED045G: Chloride	16887-00-6	1	mg/L	3860	3860	0.1	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4176289)									
EP2201732-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	15	16	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	16	16	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	48	47	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	5	5	0.0	No Limit
EP2201732-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	12	11	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	10	10	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	66	66	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4176286)									
EP2201678-003	Anonymous	EG020A-F: Iron	7439-89-6	0.05	mg/L	3.95	4.00	1.2	0% - 20%
EP2201678-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0012	0.0011	0.0	0% - 50%
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.026	0.026	0.0	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	2.99	3.03	1.2	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.087	0.086	0.0	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.034	0.033	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP2201732-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4176286) - continued									
EP2201732-003	Anonymous	EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.002	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.48	0.49	0.0	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.16	0.15	9.2	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 4173491)									
EP2201668-033	Anonymous	EG035F-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00020	<0.00020	0.0	No Limit
EP2201691-014	QC06	EG035F-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00020	<0.00020	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 4172298)									
EP2201691-004	MW06	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	9.19	9.20	0.1	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4172295)									
EP2201691-019	MW08-2	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.03	0.03	0.0	No Limit
EP2201691-006	MW010	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.01	0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4172299)									
EP2201691-004	MW06	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.83	0.83	0.0	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4173758)									
EP2201673-007	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.2	2.1	4.8	0% - 50%
EP2201691-006	MW010	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.6	0.6	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4173759)									
EP2201673-007	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.07	0.06	0.0	No Limit
EP2201691-006	MW010	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.02	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4175774)									
EP2201691-010	QC01	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4175774) - continued									
EP2201691-010	QC01	EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4175773)									
EP2201691-010	QC01	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4178502)									
EP2201691-003	MW05	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP2201691-014	QC06	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4175773)									
EP2201691-010	QC01	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4178502)									
EP2201691-003	MW05	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP2201691-014	QC06	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 4178502)									
EP2201691-003	MW05	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP2201691-014	QC06	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4177758)									
EP2201691-010	QC01	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0016	0.0017	7.6	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4177758) - continued									
EP2201691-010	QC01	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0114	0.0122	7.2	0% - 20%
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0011	0.0010	0.0	No Limit
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
EP2201691-016	QC09	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0	No Limit
		EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4177758)									
EP2201691-010	QC01	EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.142	0.139	2.1	0% - 20%
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.112	0.124	10.1	0% - 20%
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.138	0.148	6.5	0% - 20%
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0712	0.0752	5.5	0% - 20%
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	0.0210	0.0222	5.5	0% - 20%
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	0.0782	0.0772	1.3	0% - 20%
EP2201691-016	QC09	EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4177758) - continued									
EP2201691-016	QC09	EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	<0.0020	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4177758)									
EP2201691-010	QC01	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit
EP2201691-016	QC09	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4177758)									

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4177758) - continued									
EP2201691-010	QC01	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	0.0	No Limit
EP2201691-016	QC09	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4177758)									
EP2201691-010	QC01	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0027	0.0027	0.0	0% - 50%
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.556	0.578	4.0	0% - 20%
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.576	0.600	4.1	0% - 20%
EP2201691-016	QC09	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0	No Limit
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	0.0	No Limit
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	0.0	No Limit
EP262: Ethanolamines (QC Lot: 4179764)									
EP2201691-010	QC01	EP262: Ethanolamine	141-43-5	1	µg/L	<10	<10	0.0	No Limit
		EP262: Diethanolamine	111-42-2	1	µg/L	<10	<10	0.0	No Limit
		EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<10	<10	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 4174042)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA005P: pH by PC Titrator (QCLot: 4174045)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	99.8	98.5	102
EA010P: Conductivity by PC Titrator (QCLot: 4174043)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	24800 µS/cm	99.8	92.1	105
EA010P: Conductivity by PC Titrator (QCLot: 4174046)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	24800 µS/cm	101	92.1	105
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 4175700)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	104	88.1	114
				<10	1000 mg/L	100	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 4175714)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	107	88.1	114
				<10	1000 mg/L	99.0	88.1	114
ED037P: Alkalinity by PC Titrator (QCLot: 4174041)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	105	81.2	126
				<1	200 mg/L	103	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 4174044)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	110	81.2	126
				<1	200 mg/L	104	90.0	110
ED038A: Acidity (QCLot: 4175730)								
ED038: Acidity as CaCO3	----	----	mg/L	----	19.5 mg/L	122	83.6	128
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4172297)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	87.7	113
				<1	500 mg/L	99.0	87.7	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4177535)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	87.7	113
				<1	500 mg/L	99.9	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 4172296)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	104	87.9	114
				<1	1000 mg/L	106	87.9	114
ED045G: Chloride by Discrete Analyser (QCLot: 4177536)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.9	87.9	114
				<1	1000 mg/L	103	87.9	114
ED093F: Dissolved Major Cations (QCLot: 4176289)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	109	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	103	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	100	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	101	89.7	108
EG020F: Dissolved Metals by ICP-MS (QCLot: 4176286)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	103	84.0	120
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	84.0	120
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	101	86.0	120
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	100	85.0	120
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.1	84.0	120
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.8	85.0	120
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.5	85.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.6	84.0	120
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	89.0	120
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	115	84.0	120
EG035F: Dissolved Mercury by FIMS (QCLot: 4173491)								
EG035F-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00004	0.01 mg/L	99.7	87.6	115
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4172298)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	95.7	86.2	111
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4172295)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	101	88.7	113
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4172299)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	100	90.5	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4173758)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	91.6	75.8	100
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4173759)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	99.7	70.0	110
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4175771)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4175771) - continued								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	5 µg/L	82.0	36.2	90.2
EP068A: Organochlorine Pesticides (OC) (QCLot: 4175772)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	92.8	42.3	112
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	79.7	39.0	108
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	99.2	45.5	116
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	102	43.0	118
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	102	46.2	115
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	64.2	39.0	111
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	101	39.7	114
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	114	42.4	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	114	43.6	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	92.1	42.1	129
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	103	42.7	123
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	81.9	42.4	121
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	87.3	43.8	123
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	101	26.9	127
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	94.8	44.9	128
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	119	41.7	128
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	82.4	32.2	121
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	68.3	40.7	120
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	103	31.6	123
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	83.7	36.4	124
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	92.0	25.4	124
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4175772)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	81.7	38.8	110
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	92.0	34.6	115
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	7.8	0	20.1
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	82.9	27.8	102
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	105	46.1	122
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	62.1	46.6	118
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	89.6	26.8	110
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	82.3	38.8	119
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	84.6	45.0	119
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	90.1	44.6	118
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	81.1	30.2	112
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	116	43.2	123
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	106	41.1	119
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	96.2	34.4	125
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	82.7	19.9	123

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4175772) - continued								
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	110	38.0	121
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	92.2	39.5	121
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	73.4	39.7	119
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	15.8	0	137
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4175774)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	49.6	41.9	99.1
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	55.5	36.1	113
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	55.5	35.8	102
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	59.5	33.5	113
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	64.9	36.5	115
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	64.6	46.4	109
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	72.3	40.4	124
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	70.7	40.2	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	67.5	40.2	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	68.6	45.6	121
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	10 µg/L	66.6	43.2	123
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	67.2	47.3	121
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	66.4	44.8	123
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	63.7	38.8	120
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	64.6	39.4	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	64.8	40.1	123
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4175773)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	368 µg/L	67.8	39.3	103
EP071: C15 - C28 Fraction	----	100	µg/L	<100	369 µg/L	71.1	47.2	122
EP071: C29 - C36 Fraction	----	50	µg/L	<50	297 µg/L	56.1	42.5	119
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4178502)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	93.6	73.6	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4175773)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	370 µg/L	66.3	42.0	104
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	482 µg/L	66.1	46.2	116
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	283 µg/L	52.8	24.7	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4178502)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	97.8	73.9	115
EP080: BTEXN (QCLot: 4178502)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	88.2	84.1	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	95.5	81.0	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080: BTEXN (QCLot: 4178502) - continued								
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	94.5	84.4	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	112	84.3	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	105	86.5	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	79.8	77.0	118
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4177758)								
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	104	72.0	130
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	107	71.0	127
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	100	68.0	131
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	106	69.0	134
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	83.6	65.0	140
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	83.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4177758)								
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	101	73.0	129
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	96.0	72.0	129
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	118	72.0	129
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	90.4	72.0	130
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	92.4	71.0	133
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	96.0	69.0	130
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	80.4	71.0	129
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	99.6	69.0	133
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	107	72.0	134
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	79.6	65.0	144
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	110	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4177758)								
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	91.6	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	102	68.0	141
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	87.7	56.6	136
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	93.8	61.9	129
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	85.1	52.8	135
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	91.6	65.0	136
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	110	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4177758)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4177758) - continued								
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	95.2	63.0	143
EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.004 µg/L	97.2	64.0	140
EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.004 µg/L	114	67.0	138
EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	0.004 µg/L	78.0	60.9	136
EP231P: PFAS Sums (QCLot: 4177758)								
EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	----	----	----	----
EP262: Ethanolamines (QCLot: 4179764)								
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	93.0	50.0	130
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	89.5	50.0	130
EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	10 µg/L	92.1	50.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4172297)							
EP2201691-005	MW08	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4177535)							
EP2201691-001	MW01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	103	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4172296)							
EP2201691-005	MW08	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4177536)							
EP2201691-001	MW01	ED045G: Chloride	16887-00-6	1000 mg/L	101	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4176286)							
EP2201691-001	MW01	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	104	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	102	70.0	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	97.5	70.0	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	95.9	70.0	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	92.9	70.0	130

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4176286) - continued							
EP2201691-001	MW01	EG020A-F: Manganese	7439-96-5	0.2 mg/L	# Not Determined	70.0	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	99.8	70.0	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	96.3	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4173491)							
EP2201691-001	MW01	EG035F-LL: Mercury	7439-97-6	0.01 mg/L	84.8	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4172298)							
EP2201691-003	MW05	EK055G: Ammonia as N	7664-41-7	1 mg/L	98.9	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4172295)							
EP2201691-003	MW05	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	83.6	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4172299)							
EP2201691-003	MW05	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	99.0	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4173758)							
EP2201673-008	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	97.8	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4173759)							
EP2201673-008	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	102	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4175773)							
EP2201691-014	QC06	EP071: C10 - C14 Fraction	----	368 µg/L	114	44.5	122
		EP071: C15 - C28 Fraction	----	369 µg/L	138	55.1	143
		EP071: C29 - C36 Fraction	----	297 µg/L	96.3	53.6	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4178502)							
EP2201691-004	MW06	EP080: C6 - C9 Fraction	----	240 µg/L	77.6	77.0	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4175773)							
EP2201691-014	QC06	EP071: >C10 - C16 Fraction	----	370 µg/L	118	44.5	122
		EP071: >C16 - C34 Fraction	----	482 µg/L	121	55.1	143
		EP071: >C34 - C40 Fraction	----	283 µg/L	89.4	53.6	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4178502)							
EP2201691-004	MW06	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	77.0	77.0	137
EP080: BTEXN (QCLot: 4178502)							
EP2201691-004	MW06	EP080: Benzene	71-43-2	20 µg/L	84.5	77.0	122
		EP080: Toluene	108-88-3	20 µg/L	98.1	73.5	126
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4177758)							
EP2201691-014	QC06	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 µg/L	110	72.0	130
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	89.2	71.0	127
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	86.0	68.0	131

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4177758) - continued							
EP2201691-014	QC06	EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	101	69.0	134
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	100	65.0	140
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	72.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4177758)							
EP2201691-014	QC06	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	109	73.0	129
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	# Not Determined	72.0	129
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	# Not Determined	72.0	129
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 µg/L	103	72.0	130
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 µg/L	100	71.0	133
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 µg/L	72.0	69.0	130
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 µg/L	75.2	71.0	129
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	96.8	69.0	133
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	115	72.0	134
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.004 µg/L	74.4	65.0	144
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 µg/L	97.8	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4177758)							
EP2201691-014	QC06	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.004 µg/L	92.0	67.0	137
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.01 µg/L	110	68.0	141
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.01 µg/L	89.9	56.6	136
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.01 µg/L	71.7	61.9	129
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.01 µg/L	76.6	52.8	135
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 µg/L	96.4	65.0	136
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 µg/L	102	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4177758)							
EP2201691-014	QC06	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	108	63.0	143
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 µg/L	82.8	64.0	140
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 µg/L	93.2	67.0	138
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 µg/L	73.6	60.9	136

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201691**	Page	: 1 of 17
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 724-PEREN295751 PERDAMAN	Date Samples Received	: 14-Feb-2022
Site	: ----	Issue Date	: 22-Feb-2022
Sampler	: Nick Taylor	No. of samples received	: 19
Order number	: ----	No. of samples analysed	: 19

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2201691--005	MW08	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2201691--005	MW08	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	EP2201691--001	MW01	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2201691--014	QC06	**Perfluoropentanoic acid (PFPeA)**	2706-90-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2201691--014	QC06	**Perfluorohexanoic acid (PFHxA)**	307-24-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
MW01, MW010, BH12,	MW08, BH22, QC01	----	----	----	15-Feb-2022	09-Feb-2022	**6**
Clear Plastic Bottle - Natural							
QC06,	MW08-2	----	----	----	15-Feb-2022	10-Feb-2022	**5**
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Natural							
MW08, BH22, QC01	MW010, BH12,	----	----	----	14-Feb-2022	10-Feb-2022	**4**
Clear Plastic Bottle - Natural							
MW05, BH31, MW08-2	MW06, QC06,	----	----	----	14-Feb-2022	11-Feb-2022	**3**
EK057G: Nitrite as N by Discrete Analyser							

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EK057G: Nitrite as N by Discrete Analyser - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural MW08, MW010, BH22, BH12, QC01	----	----	----	14-Feb-2022	11-Feb-2022	**3**
Clear Plastic Bottle - Natural MW05, MW06, BH31, QC06, MW08-2	----	----	----	14-Feb-2022	12-Feb-2022	**2**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser						
Clear Plastic Bottle - Natural MW08, MW010, BH22, BH12, QC01	----	----	----	14-Feb-2022	11-Feb-2022	**3**
Clear Plastic Bottle - Natural MW05, MW06, BH31, QC06, MW08-2	----	----	----	14-Feb-2022	12-Feb-2022	**2**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser						
Clear Plastic Bottle - Natural MW08, MW010, BH22, BH12, QC01	17-Feb-2022	10-Feb-2022	**7**	----	----	----
Clear Plastic Bottle - Natural MW05, MW06, BH31, QC06, MW08-2	17-Feb-2022	11-Feb-2022	**6**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser						
Clear Plastic Bottle - Natural MW08, MW010, BH22, BH12, QC01	17-Feb-2022	11-Feb-2022	**6**	----	----	----
Clear Plastic Bottle - Natural MW05, MW06, BH31, QC06, MW08-2	17-Feb-2022	12-Feb-2022	**5**	----	----	----

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP) - Continued					
PAH/Phenols (GC/MS - SIM)	1	14	7.14	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	6	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	6	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	14	7.14	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Ethanolamines by LCMSMS	0	10	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	6	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	6	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**15-Feb-2022**	09-Feb-2022	×
Clear Plastic Bottle - Natural (EA005-P) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**15-Feb-2022**	10-Feb-2022	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**15-Feb-2022**	09-Mar-2022	✓
Clear Plastic Bottle - Natural (EA010-P) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**15-Feb-2022**	10-Mar-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**16-Feb-2022**	16-Feb-2022	✓
Clear Plastic Bottle - Natural (EA015H) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**16-Feb-2022**	17-Feb-2022	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**15-Feb-2022**	23-Feb-2022	✓
Clear Plastic Bottle - Natural (ED037-P) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**15-Feb-2022**	24-Feb-2022	✓
ED038A: Acidity							
Clear Plastic Bottle - Natural (ED038) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**16-Feb-2022**	23-Feb-2022	✓
Clear Plastic Bottle - Natural (ED038) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**16-Feb-2022**	24-Feb-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**14-Feb-2022**	09-Mar-2022	✓
Clear Plastic Bottle - Natural (ED041G) MW01	**09-Feb-2022**	**----**	----	----	**21-Feb-2022**	09-Mar-2022	✓
Clear Plastic Bottle - Natural (ED041G) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**14-Feb-2022**	10-Mar-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**14-Feb-2022**	09-Mar-2022	✓
Clear Plastic Bottle - Natural (ED045G) MW01	**09-Feb-2022**	**----**	----	----	**21-Feb-2022**	09-Mar-2022	✓
Clear Plastic Bottle - Natural (ED045G) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**14-Feb-2022**	10-Mar-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**16-Feb-2022**	09-Mar-2022	✓
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**16-Feb-2022**	10-Mar-2022	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**16-Feb-2022**	08-Aug-2022	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) MW05, MW06, BH31, QC06, MW07-2, MW08-2	**10-Feb-2022**	**----**	----	----	**16-Feb-2022**	09-Aug-2022	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F-LL) MW01, MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**15-Feb-2022**	09-Mar-2022	✓
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F-LL) MW05, MW06, BH31, QC06, MW07-2, MW08-2	**10-Feb-2022**	**----**	----	----	**15-Feb-2022**	10-Mar-2022	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK055G) MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**14-Feb-2022**	10-Feb-2022	×
Clear Plastic Bottle - Natural (EK055G) MW05, MW06, BH31, QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**14-Feb-2022**	11-Feb-2022	×
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) MW08, MW010, BH22, BH12, QC01	**09-Feb-2022**	**----**	----	----	**14-Feb-2022**	11-Feb-2022	×
Clear Plastic Bottle - Natural (EK057G) MW05, MW06, BH31, QC06, MW08-2	**10-Feb-2022**	**----**	----	----	**14-Feb-2022**	12-Feb-2022	×

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Natural (EK059G) MW08, BH22, QC01	MW010, BH12,	**09-Feb-2022**	**----**	----	----	**14-Feb-2022**	11-Feb-2022	×
Clear Plastic Bottle - Natural (EK059G) MW05, BH31, MW08-2	MW06, QC06,	**10-Feb-2022**	**----**	----	----	**14-Feb-2022**	12-Feb-2022	×
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Natural (EK061G) MW08, BH22, QC01	MW010, BH12,	**09-Feb-2022**	**17-Feb-2022**	10-Feb-2022	×	**17-Feb-2022**	17-Mar-2022	✓
Clear Plastic Bottle - Natural (EK061G) MW05, BH31, MW08-2	MW06, QC06,	**10-Feb-2022**	**17-Feb-2022**	11-Feb-2022	×	**17-Feb-2022**	17-Mar-2022	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Natural (EK067G) MW08, BH22, QC01	MW010, BH12,	**09-Feb-2022**	**17-Feb-2022**	11-Feb-2022	×	**17-Feb-2022**	17-Mar-2022	✓
Clear Plastic Bottle - Natural (EK067G) MW05, BH31, MW08-2	MW06, QC06,	**10-Feb-2022**	**17-Feb-2022**	12-Feb-2022	×	**17-Feb-2022**	17-Mar-2022	✓
EP066: Polychlorinated Biphenyls (PCB)								
Amber Glass Bottle - Unpreserved (EP066) QC05		**09-Feb-2022**	**16-Feb-2022**	16-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP066) MW04, MW06, QC09	MW05, BH31,	**10-Feb-2022**	**16-Feb-2022**	17-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
EP068A: Organochlorine Pesticides (OC)								
Amber Glass Bottle - Unpreserved (EP068) QC05		**09-Feb-2022**	**16-Feb-2022**	16-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP068) MW04, MW06, QC09	MW05, BH31,	**10-Feb-2022**	**16-Feb-2022**	17-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068B: Organophosphorus Pesticides (OP)							
Amber Glass Bottle - Unpreserved (EP068) QC05	**09-Feb-2022**	**16-Feb-2022**	16-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP068) MW04, MW05, MW06, BH31, QC09	**10-Feb-2022**	**16-Feb-2022**	17-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) MW08, MW010, BH22, BH12, QC01, QC03, QC05	**09-Feb-2022**	**16-Feb-2022**	16-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) MW05, MW06, BH31, QC06, QC08, QC09, MW08-2	**10-Feb-2022**	**16-Feb-2022**	17-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) MW08, MW010, BH22, BH12, QC01, QC03, QC05	**09-Feb-2022**	**16-Feb-2022**	16-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP071) MW05, MW06, BH31, QC06, QC08, QC09, MW08-2	**10-Feb-2022**	**16-Feb-2022**	17-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP080) QC08	**10-Feb-2022**	**17-Feb-2022**	17-Feb-2022	✓	**17-Feb-2022**	17-Feb-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW08, MW010, BH22, BH12, QC01, QC03, QC05	**09-Feb-2022**	**17-Feb-2022**	23-Feb-2022	✓	**17-Feb-2022**	23-Feb-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW05, MW06, BH31, QC06, QC09, MW08-2	**10-Feb-2022**	**17-Feb-2022**	24-Feb-2022	✓	**17-Feb-2022**	24-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) MW08, MW010, BH22, BH12, QC01, QC03, QC05	**09-Feb-2022**	**16-Feb-2022**	16-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP071) MW05, MW06, BH31, QC06, QC08, QC09, MW08-2	**10-Feb-2022**	**16-Feb-2022**	17-Feb-2022	✓	**18-Feb-2022**	28-Mar-2022	✓
Amber Glass Bottle - Unpreserved (EP080) QC08	**10-Feb-2022**	**17-Feb-2022**	17-Feb-2022	✓	**17-Feb-2022**	17-Feb-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW08, MW010, BH22, BH12, QC01, QC03, QC05	**09-Feb-2022**	**17-Feb-2022**	23-Feb-2022	✓	**17-Feb-2022**	23-Feb-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW05, MW06, BH31, QC06, QC09, MW08-2	**10-Feb-2022**	**17-Feb-2022**	24-Feb-2022	✓	**17-Feb-2022**	24-Feb-2022	✓
EP080: BTEXN							
Amber Glass Bottle - Unpreserved (EP080) QC08	**10-Feb-2022**	**17-Feb-2022**	17-Feb-2022	✓	**17-Feb-2022**	17-Feb-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW08, MW010, BH22, BH12, QC01, QC03, QC05	**09-Feb-2022**	**17-Feb-2022**	23-Feb-2022	✓	**17-Feb-2022**	23-Feb-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW05, MW06, BH31, QC06, QC09, MW08-2	**10-Feb-2022**	**17-Feb-2022**	24-Feb-2022	✓	**17-Feb-2022**	24-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT)								
MW01,	MW08,	**09-Feb-2022**	**17-Feb-2022**	08-Aug-2022	✓	**18-Feb-2022**	08-Aug-2022	✓
MW010,	BH22,							
BH12,	QC01,							
QC04,	QC05							
HDPE (no PTFE) (EP231X-SUT)								
MW05,	MW06,	**10-Feb-2022**	**17-Feb-2022**	09-Aug-2022	✓	**18-Feb-2022**	09-Aug-2022	✓
BH31,	QC06,							
QC09,	TBW46,							
MW07-2,	MW08-2							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X-SUT)								
MW01,	MW08,	**09-Feb-2022**	**17-Feb-2022**	08-Aug-2022	✓	**18-Feb-2022**	08-Aug-2022	✓
MW010,	BH22,							
BH12,	QC01,							
QC04,	QC05							
HDPE (no PTFE) (EP231X-SUT)								
MW05,	MW06,	**10-Feb-2022**	**17-Feb-2022**	09-Aug-2022	✓	**18-Feb-2022**	09-Aug-2022	✓
BH31,	QC06,							
QC09,	TBW46,							
MW07-2,	MW08-2							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X-SUT)								
MW01,	MW08,	**09-Feb-2022**	**17-Feb-2022**	08-Aug-2022	✓	**18-Feb-2022**	08-Aug-2022	✓
MW010,	BH22,							
BH12,	QC01,							
QC04,	QC05							
HDPE (no PTFE) (EP231X-SUT)								
MW05,	MW06,	**10-Feb-2022**	**17-Feb-2022**	09-Aug-2022	✓	**18-Feb-2022**	09-Aug-2022	✓
BH31,	QC06,							
QC09,	TBW46,							
MW07-2,	MW08-2							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT)								
MW01,	MW08,	**09-Feb-2022**	**17-Feb-2022**	08-Aug-2022	✓	**18-Feb-2022**	08-Aug-2022	✓
MW010,	BH22,							
BH12,	QC01,							
QC04,	QC05							
HDPE (no PTFE) (EP231X-SUT)								
MW05,	MW06,	**10-Feb-2022**	**17-Feb-2022**	09-Aug-2022	✓	**18-Feb-2022**	09-Aug-2022	✓
BH31,	QC06,							
QC09,	TBW46,							
MW07-2,	MW08-2							
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X-SUT)								
MW01,	MW08,	**09-Feb-2022**	**17-Feb-2022**	08-Aug-2022	✓	**18-Feb-2022**	08-Aug-2022	✓
MW010,	BH22,							
BH12,	QC01,							
QC04,	QC05							
HDPE (no PTFE) (EP231X-SUT)								
MW05,	MW06,	**10-Feb-2022**	**17-Feb-2022**	09-Aug-2022	✓	**18-Feb-2022**	09-Aug-2022	✓
BH31,	QC06,							
QC09,	TBW46,							
MW07-2,	MW08-2							
EP262: Ethanolamines								
Amber Bottle Unpreserved for Specialist Organics (EP262)								
MW08,	MW010,	**09-Feb-2022**	**----**	----	----	**16-Feb-2022**	16-Feb-2022	✓
BH22,	BH12,							
QC01,	QC05							
Amber Bottle Unpreserved for Specialist Organics (EP262)								
QC06,	QC09,	**10-Feb-2022**	**----**	----	----	**16-Feb-2022**	17-Feb-2022	✓
MW07-2,	MW08-2							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	20	15.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	14	7.14	10.00	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	6	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	3	24	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	6	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	10.53	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	7.14	10.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acidity as Calcium Carbonate	ED038	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	25	16.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	17	23.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Pesticides by GCMS	EP068	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	24	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	17	**23.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	38	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	0	10	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	14	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Pesticides by GCMS	EP068	0	6	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	6	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	**11.76**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Acidity as Calcium Carbonate	ED038	WATER	In house: Referenced to APHA 2310 B Acidity is determined by manual titration with a standardised alkali to an end-point pH of 8.3. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS - Low Level	EG035F-LL	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).

Analytical Methods	Method	Matrix	Method Descriptions
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is concentrated, combined with an equal volume of reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines by LCMSMS	EP262	WATER	In house: LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office: Perth

Report Results to: Bernie Weekes | Mobile: 0407 817 762 | Email: bernie.weekes@coffey.com

Invoices to: Tetra Tech Coffey (Perth) | Phone: | Email:

Project No: PEREN295751 | Task No:

Project Name: Perdaman | Laboratory: ALS

Sampler's Name: Nick Taylor | Project Manager: Bernie Weekes

Quote number (if different to current quoted prices): EP/1105/21

Special Instructions: firm 5 day tat required on all samples. MW04 limited sample volume. BH22 black water with organic odour (source of colour unknown). Metals were not field filtered. All metals samples were field filtered. BH31 slight organic odour water light grey in colour. Super trace for PCB's, OC/OP pesticides no longer required just standard level

Analysis Request Section

ALS Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	ASSGW-1	FW-2(ANZECC)	EP066 (PCB)	EP068-A (OC Pesticides)	EP068B (OP pesticides)	EP231X-SUT	EP262	NT-08	W-07	W-18	Hold			NOTES
1	MW01	2/09/2022		Water		3-5 day	x	x				x								
SNR	MW02	2/09/2022		Water		3-5 day	x	x				x	x	x						
SNR	MW03	2/09/2022		Water		3-5 day	x	x				x	x	x	x					
2	MW04	2/10/2022		Water		3-5 day		x	x	x	x	x		x	x					
3	MW05	2/10/2022		Water		3-5 day		x	x	x	x	x		x	x					
4	MW06	2/10/2022		Water		3-5 day		x	x	x	x	x		x	x					
SNR	MW07	2/09/2022		Water		3-5 day	x	x				x	x	x	x					
5	MW08	2/09/2022		Water		3-5 day	x	x				x	x	x	x					
SNR	MW09	2/09/2022		Water		3-5 day	x	x				x	x	x						
6	MW010	2/09/2022		Water		3-5 day	x	x				x	x	x	x					
7	BH22	2/09/2022		Water		3-5 day	x	x				x	x	x	x					
8	BH31	2/10/2022		Water		3-5 day		x	x	x	x	x		x	x					
9	BH12	2/09/2022		Water		3-5 day	x	x				x	x	x	x					
SNR	BH27	2/09/2022		Water		3-5 day	x	x				x	x	x						
10	QC01	2/09/2022		Water		3-5 day	x	x				x	x	x	x					
-	QC02	2/09/2022		Water		3-5 day										x				Forward this sample to Eurofins and request testing for same suite as QC1

Environmental Division Perth
Work Order Reference
EP2201691

Telephone : -- 61-8-9406 1301

RELINQUISHED BY

Name: Bernie Weekes | Date: 2/11/2022

RECEIVED BY

Name: Louffy ALS | Date: 14/2 1340

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐

Chain of custody
Issued: 30 July 2020
UNCONTROLLED WHEN PRINTED

TETRA TECH COFFEY

Consigning Office: Perth

Report Results to: Bernie Weekes | Mobile: 0407 817 762 | Email: bernie.weekes@coffey.com

Invoices to: Tetra Tech Coffey (Perth) | Phone: | Email:

Project No: PEREN295751 | Task No:

Project Name: Perdaman | Laboratory: ALS

Sampler's Name: Anne Foster | Project Manager: Bernie Weekes

Quote number (if different to current quoted prices):

Special Instructions: firm 5 day tat required on all samples. MW04 limited sample water. BH22 black water with organic odour.

Analysis Request Section

ALS Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	ASSGW-1	FW-2(ANZECC)	EP066 (PCB)	EP068-A (OC Pesticides)	EP068B (OP pesticides)	EP231X-SUT	EP262	NT-08	W-07	W-18	Hold			NOTES
11	QC03	2/09/2022		Water		3-5 day									X					
12	QC04	2/09/2022		Water		3-5 day						X								
13	QC05	2/09/2022		Water		3-5 day			X	X	X	X	X		X					
14	QC06	2/10/2022		Water		3-5 day	X	X				X	X	X	X					
–	QC07	2/10/2022		Water		3-5 day											X			Forward this sample to Eurofins and request same testing as QC06
15	QC08	2/10/2022		Water		3-5 day									X					
16	QC09	2/10/2022		Water		3-5 day			X	X	X	X	X		X					
17	TBW46	2/10/2022		Water		3-5 day										X				
18	MW07-2	2/10/2022		Water		3-5 day	X	X				X	X	X	X					
19	MW08-2	2/10/2022		Water		3-5 day	X	X				X	X	X	X					

RELINQUISHED BY		RECEIVED BY	
Name: Bernie Weekes	Date: 2/11/2022	Name:	Date:
Coffey	Time:	Company:	Time:
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)

- All Samples Recieved in Good Condition ☐
- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2202113**	Page	: 1 of 19
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman PSI	Date Samples Received	: 23-Feb-2022 11:30
Order number	: ----	Date Analysis Commenced	: 23-Feb-2022
C-O-C number	: ----	Issue Date	: 01-Mar-2022 09:14
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 8		
No. of samples analysed	: 8		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X(-SUT) and EP262 conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP262: Matrix spike recovery not determined due to dilution requirement.
- EP262 :Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG020 and EG035: Metals LOR for sample EP2202113 -001 to -004 and -008 raised due to high TDS content.
- EK055G: Ammonia LOR raised for sample #1, 2, 4 and 8 due to possible sample matrix interference.
- EP262: ALS is not NATA accredited for the analysis of MDEA.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW03	MW02	BH27	QC1	QC3
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2202113-001	EP2202113-002	EP2202113-003	EP2202113-004	EP2202113-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.54	7.26	7.10	7.58	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	122000	177000	190000	121000	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	108000	177000	183000	106000	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	117	60	73	121	----
Total Alkalinity as CaCO3	----	1	mg/L	117	60	73	121	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	27	30	36	26	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5580	7270	6880	5630	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	50900	86900	100000	51500	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	772	1250	1490	782	----
Magnesium	7439-95-4	1	mg/L	3120	5420	6020	3100	----
Sodium	7440-23-5	1	mg/L	33200	51000	61500	31900	----
Potassium	7440-09-7	1	mg/L	1260	1830	2160	1280	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.20	<0.20	<0.20	<0.20	----
Arsenic	7440-38-2	0.001	mg/L	<0.020	<0.020	<0.020	<0.020	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	----
Chromium	7440-47-3	0.001	mg/L	<0.020	<0.020	<0.020	<0.020	----
Copper	7440-50-8	0.001	mg/L	<0.020	<0.020	<0.020	<0.020	----
Nickel	7440-02-0	0.001	mg/L	<0.020	<0.020	<0.020	<0.020	----
Lead	7439-92-1	0.001	mg/L	<0.020	<0.020	<0.020	<0.020	----
Zinc	7440-66-6	0.005	mg/L	<0.100	<0.100	<0.100	<0.100	----
Manganese	7439-96-5	0.001	mg/L	<0.020	0.033	0.657	<0.020	----
Iron	7439-89-6	0.05	mg/L	<1.00	<1.00	<1.00	<1.00	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW03	MW02	BH27	QC1	QC3
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2202113-001	EP2202113-002	EP2202113-003	EP2202113-004	EP2202113-005
				Result	Result	Result	Result	Result
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.05	<0.05	0.07	<0.05	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	0.01	0.02	0.02	<0.01	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	0.18	0.92	1.22	0.20	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.19	0.94	1.24	0.20	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	1.4	1.6	0.8	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	0.9	2.3	2.8	1.0	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.11	0.08	0.46	0.11	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	1550	2600	2960	1570	----
ø Total Cations	----	0.01	meq/L	1770	2770	3300	1710	----
ø Ionic Balance	----	0.01	%	6.53	3.16	5.34	4.32	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	<1	----	----	<1	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	<0.5	----	----	<0.5	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	----	----	<0.5	----
beta-BHC	319-85-7	0.5	µg/L	<0.5	----	----	<0.5	----
gamma-BHC	58-89-9	0.5	µg/L	<0.5	----	----	<0.5	----
delta-BHC	319-86-8	0.5	µg/L	<0.5	----	----	<0.5	----
Heptachlor	76-44-8	0.5	µg/L	<0.5	----	----	<0.5	----
Aldrin	309-00-2	0.5	µg/L	<0.5	----	----	<0.5	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	----	----	<0.5	----
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	----	----	<0.5	----
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	----	----	<0.5	----
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	----	----	<0.5	----
Dieldrin	60-57-1	0.5	µg/L	<0.5	----	----	<0.5	----
4.4`-DDE	72-55-9	0.5	µg/L	<0.5	----	----	<0.5	----
Endrin	72-20-8	0.5	µg/L	<0.5	----	----	<0.5	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW03	MW02	BH27	QC1	QC3
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2202113-001	EP2202113-002	EP2202113-003	EP2202113-004	EP2202113-005
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	----	----	<0.5	----
4.4`-DDD	72-54-8	0.5	µg/L	<0.5	----	----	<0.5	----
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	----	----	<0.5	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	----	----	<0.5	----
4.4`-DDT	50-29-3	2.0	µg/L	<2.0	----	----	<2.0	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	----	----	<0.5	----
Methoxychlor	72-43-5	2.0	µg/L	<2.0	----	----	<2.0	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	<0.5	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	<0.5	----	----	<0.5	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	<0.5	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	----	----	<0.5	----
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	----	----	<0.5	----
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	----	----	<2.0	----
Dimethoate	60-51-5	0.5	µg/L	<0.5	----	----	<0.5	----
Diazinon	333-41-5	0.5	µg/L	<0.5	----	----	<0.5	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	----	----	<0.5	----
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	----	----	<2.0	----
Malathion	121-75-5	0.5	µg/L	<0.5	----	----	<0.5	----
Fenthion	55-38-9	0.5	µg/L	<0.5	----	----	<0.5	----
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	----	----	<0.5	----
Parathion	56-38-2	2.0	µg/L	<2.0	----	----	<2.0	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	----	----	<0.5	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	----	----	<0.5	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	----	----	<0.5	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	----	----	<0.5	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	----	----	<0.5	----
Ethion	563-12-2	0.5	µg/L	<0.5	----	----	<0.5	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	----	----	<0.5	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	----	----	<0.5	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	<1.0	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	<1.0	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	<1.0	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW03	MW02	BH27	QC1	QC3
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2202113-001	EP2202113-002	EP2202113-003	EP2202113-004	EP2202113-005
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	<1.0	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	<1.0	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	<1.0	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	<1.0	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	<1.0	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	<1.0	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	<1.0	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	<1.0	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	<1.0	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	<0.5	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	----	----	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	----	----	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	----	----	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	<1	<1
Toluene	108-88-3	2	µg/L	<2	----	----	<2	<2

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW03	MW02	BH27	QC1	QC3
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2202113-001	EP2202113-002	EP2202113-003	EP2202113-004	EP2202113-005
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	<2	<2
^ Total Xylenes	----	2	µg/L	<2	----	----	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	----	----	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	----	----	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	**0.0047**	**0.0012**	**0.0071**	**0.0048**	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	**0.0064**	<0.0005	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	**0.0016**	<0.0005	**0.0285**	**0.0014**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	**0.0026**	<0.0005	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	**0.0269**	<0.0002	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	**0.299**	**0.0647**	**0.0171**	**0.278**	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	**0.562**	**0.104**	**0.0272**	**0.601**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	**0.104**	**0.0020**	**0.0036**	**0.103**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	**0.289**	**0.0264**	**0.0319**	**0.318**	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	**0.0109**	<0.0005	**0.0034**	**0.0129**	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	**0.0006**	<0.0005	<0.0005	**0.0006**	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW03	MW02	BH27	QC1	QC3
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2202113-001	EP2202113-002	EP2202113-003	EP2202113-004	EP2202113-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	**0.006**	<0.001	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----
EP231P: PFAS Sums								
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	**0.0016**	<0.0002	**0.0554**	**0.0014**	----
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	**1.27**	**0.198**	**0.152**	**1.32**	----
^ Sum of PFAS	----	0.0002	µg/L	**1.27**	**0.198**	**0.161**	**1.32**	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<10	<10	<10	<10	----
Diethanolamine	111-42-2	1	µg/L	<10	<10	<10	<10	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<10	<10	<10	<10	----
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	MW03	MW02	BH27	QC1	QC3
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2202113-001	EP2202113-002	EP2202113-003	EP2202113-004	EP2202113-005
				Result	Result	Result	Result	Result
EP066S: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	1	%	37.7	----	----	44.4	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	51.6	----	----	50.9	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	46.9	----	----	42.3	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	25.4	----	----	27.0	----
2-Chlorophenol-D4	93951-73-6	1.0	%	44.5	----	----	47.1	----
2.4.6-Tribromophenol	118-79-6	1.0	%	35.6	----	----	51.1	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	53.9	----	----	55.2	----
Anthracene-d10	1719-06-8	1.0	%	56.6	----	----	57.6	----
4-Terphenyl-d14	1718-51-0	1.0	%	51.4	----	----	51.9	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	80.8	----	----	84.3	88.0
Toluene-D8	2037-26-5	2	%	99.0	----	----	97.6	99.7
4-Bromofluorobenzene	460-00-4	2	%	77.2	----	----	77.1	87.8
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	91.8	90.6	92.5	91.5	----
13C8-PFOA	----	0.0005	%	83.6	83.3	94.0	92.7	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	----	----	7.35	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	----	135000	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	----	124000	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	97	----	----
Total Alkalinity as CaCO3	----	1	mg/L	----	----	97	----	----
ED038A: Acidity								
Acidity as CaCO3	----	1	mg/L	----	----	32	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	6440	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	----	----	62600	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	----	1190	----	----
Magnesium	7439-95-4	1	mg/L	----	----	4360	----	----
Sodium	7440-23-5	1	mg/L	----	----	41400	----	----
Potassium	7440-09-7	1	mg/L	----	----	1430	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	----	----	<0.20	----	----
Arsenic	7440-38-2	0.001	mg/L	----	----	<0.020	----	----
Cadmium	7440-43-9	0.0001	mg/L	----	----	<0.0020	----	----
Chromium	7440-47-3	0.001	mg/L	----	----	<0.020	----	----
Copper	7440-50-8	0.001	mg/L	----	----	<0.020	----	----
Nickel	7440-02-0	0.001	mg/L	----	----	<0.020	----	----
Lead	7439-92-1	0.001	mg/L	----	----	<0.020	----	----
Zinc	7440-66-6	0.005	mg/L	----	----	<0.100	----	----
Manganese	7439-96-5	0.001	mg/L	----	----	1.35	----	----
Iron	7439-89-6	0.05	mg/L	----	----	<1.00	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EG020T: Total Metals by ICP-MS - Continued								
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	----	----	<0.00020	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	----	<0.05	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	----	----	**0.02**	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	----	----	**0.05**	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	**0.07**	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	**1.3**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	----	----	**1.4**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	----	----	**0.39**	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	----	----	**1900**	----	----
ø Total Cations	----	0.01	meq/L	----	----	**2260**	----	----
ø Ionic Balance	----	0.01	%	----	----	**8.51**	----	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	<1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	<0.5	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-BHC	319-85-7	0.5	µg/L	<0.5	----	----	----	----
gamma-BHC	58-89-9	0.5	µg/L	<0.5	----	----	----	----
delta-BHC	319-86-8	0.5	µg/L	<0.5	----	----	----	----
Heptachlor	76-44-8	0.5	µg/L	<0.5	----	----	----	----
Aldrin	309-00-2	0.5	µg/L	<0.5	----	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	----	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	----	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	----	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	----	----	----	----
Dieldrin	60-57-1	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDE	72-55-9	0.5	µg/L	<0.5	----	----	----	----
Endrin	72-20-8	0.5	µg/L	<0.5	----	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDD	72-54-8	0.5	µg/L	<0.5	----	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	----	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDT	50-29-3	2.0	µg/L	<2.0	----	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	----	----	----	----
Methoxychlor	72-43-5	2.0	µg/L	<2.0	----	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	<0.5	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	----	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	----	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	----	----	----	----
Dimethoate	60-51-5	0.5	µg/L	<0.5	----	----	----	----
Diazinon	333-41-5	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	----	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	----	----	----	----
Malathion	121-75-5	0.5	µg/L	<0.5	----	----	----	----
Fenthion	55-38-9	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	----	----	----	----
Parathion	56-38-2	2.0	µg/L	<2.0	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued								
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	----	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	----	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	----	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	----	----	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	----	----	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	----	----	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	----	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	----	----	**0.0011**	----	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	----	----	<0.0005	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	----	----	<0.0005	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	----	----	<0.0002	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	----	----	**0.0648**	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	----	----	**0.114**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	----	----	**0.0012**	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	----	----	**0.0558**	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	----	----	<0.0005	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	----	----	<0.0005	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	----	----	<0.0005	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	----	----	<0.0005	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	----	----	<0.0005	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	----	----	<0.001	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	----	----	<0.001	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	----	----	<0.001	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	----	----	<0.001	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	----	----	<0.0005	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	----	----	<0.0005	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	----	----	<0.001	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	----	----	<0.001	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	----	----	<0.001	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	----	----	<0.001	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	----	----	<0.0002	----	----
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	----	----	**0.237**	----	----
^ Sum of PFAS	----	0.0002	µg/L	----	----	**0.237**	----	----
EP262: Ethanolamines								
Ethanolamine	141-43-5	1	µg/L	<10	----	<10	----	----
Diethanolamine	111-42-2	1	µg/L	<10	----	<10	----	----
Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<10	----	<10	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	1	%	**32.2**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC4	TBW166	MW09	----	----
			Sampling date / time	21-Feb-2022 00:00	21-Feb-2022 00:00	21-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2202113-006	EP2202113-007	EP2202113-008	--------	--------
				Result	Result	Result	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	50.1	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	37.5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	14.2	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	38.2	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	39.1	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	47.1	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%	49.6	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	44.5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	88.2	84.8	----	----	----
Toluene-D8	2037-26-5	2	%	99.0	98.6	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	85.0	84.8	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	98.4	----	----	----	----
13C8-PFOA	----	0.02	%	95.4	----	----	----	----
13C4-PFOS	----	0.0005	%	----	----	94.2	----	----
13C8-PFOA	----	0.0005	%	----	----	91.0	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	27	136
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	50	146
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	27	153
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	67
2-Chlorophenol-D4	93951-73-6	29	120
2.4.6-Tribromophenol	118-79-6	10	131
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	34	131
Anthracene-d10	1719-06-8	43	126
4-Terphenyl-d14	1718-51-0	41	142
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP262: Ethanolamines

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2202113**	Page	: 1 of 15
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman PSI	Date Samples Received	: 23-Feb-2022
Order number	: ----	Date Analysis Commenced	: 23-Feb-2022
C-O-C number	: ----	Issue Date	: 01-Mar-2022
Sampler	: SANJANA AUDIT		
Site	: ----		
Quote number	: EP/1105/21_V3		
No. of samples received	: 8		
No. of samples analysed	: 8		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
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General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 4193585)									
EP2202161-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.41	8.41	0.0	0% - 20%
EP2202105-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.42	8.46	0.5	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4193586)									
EP2202161-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	543	545	0.4	0% - 20%
EP2202105-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	916	927	1.2	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 4192441)									
EP2202046-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	234	260	10.3	0% - 20%
EP2202046-011	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	256	250	2.6	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4193588)									
EP2202161-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	4	4	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	138	141	2.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	142	145	2.0	0% - 20%
EP2202105-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	8	11	28.2	0% - 50%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	212	210	1.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	220	220	0.0	0% - 20%
ED038A: Acidity (QC Lot: 4195053)									
EP2202034-001	Anonymous	ED038: Acidity as CaCO3	----	1	mg/L	95	97	1.7	0% - 20%
EP2202113-001	MW03	ED038: Acidity as CaCO3	----	1	mg/L	27	27	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4191784)									
EP2202113-002	MW02	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	7270	7340	1.1	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4191785)									

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED045G: Chloride by Discrete Analyser (QC Lot: 4191785) - continued									
EP2202113-002	MW02	ED045G: Chloride	16887-00-6	1	mg/L	86900	88000	1.3	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4193078)									
EP2202105-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	60	60	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	43	43	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	75	75	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	12	13	0.0	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4193077)									
EP2202034-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.453	0.458	1.2	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.069	0.072	4.4	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.031	0.032	3.5	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.01	0.01	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	19.6	19.9	1.7	0% - 20%
EP2202105-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.128	0.129	1.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.012	0.012	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.12	0.06	63.9	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 4193115)									
EP2202034-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.006	0.006	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.003	0.004	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.0	No Limit
EP2202088-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
				Laboratory Duplicate (DUP) Report					
EG020T: Total Metals by ICP-MS (QC Lot: 4193115) - continued									
EP2202088-001	Anonymous	EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 4195695)									
EP2202113-001	MW03	EG035F-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00020	<0.00020	0.0	No Limit
EP2202163-001	Anonymous	EG035F-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00004	<0.00004	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4193126)									
EP2202089-007	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 4191375)									
EP2202113-002	MW02	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.05	<0.05	0.0	No Limit
EP2202113-001	MW03	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.05	<0.05	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4191783)									
EP2202113-002	MW02	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.02	0.02	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4191374)									
EP2202113-002	MW02	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.94	0.93	0.0	0% - 20%
EP2202113-001	MW03	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.19	0.19	0.0	0% - 50%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4193504)									
EP2201996-021	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.2	3.5	18.6	0% - 20%
EP2202113-001	MW03	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	0.8	12.7	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4193505)									
EP2201996-021	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.70	0.65	7.6	0% - 20%
EP2202113-001	MW03	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.11	0.12	10.5	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4192469)									
EP2201996-021	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<0.02 mg/L	<20	0.0	No Limit
EP2202113-006	QC4	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4192469)									
EP2201996-021	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<0.02 mg/L	<20	0.0	No Limit
EP2202113-006	QC4	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 4192469)									
EP2201996-021	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<0.001 mg/L	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<0.002 mg/L	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<0.002 mg/L	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<0.002 mg/L	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<0.002 mg/L	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<0.005 mg/L	<5	0.0	No Limit
EP2202113-006	QC4	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080: BTEXN (QC Lot: 4192469) - continued									
EP2202113-006	QC4	EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4194459)									
EP2202113-006	QC4	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4194459)									
EP2202113-006	QC4	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4194459)									
EP2202113-006	QC4	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4194459)									
EP2202113-006	QC4	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4194459) - continued									
EP2202113-006	QC4	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4194459)									
EP2202113-006	QC4	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP262: Ethanolamines (QC Lot: 4194734)									
EP2202118-001	Anonymous	EP262: Ethanolamine	141-43-5	1	µg/L	<10	<10	0.0	No Limit
		EP262: Diethanolamine	111-42-2	1	µg/L	<10	<10	0.0	No Limit
		EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<10	<10	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 4193585)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.5	102
				----	7 pH Unit	100	98.5	102
EA010P: Conductivity by PC Titrator (QCLot: 4193586)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	24800 µS/cm	96.4	92.1	105
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 4192441)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	101	88.1	114
				<10	1000 mg/L	99.4	88.1	114
ED037P: Alkalinity by PC Titrator (QCLot: 4193588)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	101	81.2	126
				<1	200 mg/L	99.9	90.0	110
ED038A: Acidity (QCLot: 4195053)								
ED038: Acidity as CaCO3	----	----	mg/L	----	19.5 mg/L	97.4	83.6	128
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4191784)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	87.7	113
				<1	500 mg/L	97.1	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 4191785)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	92.8	87.9	114
				<1	1000 mg/L	105	87.9	114
ED093F: Dissolved Major Cations (QCLot: 4193078)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	111	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	103	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	102	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	89.7	108
EG020F: Dissolved Metals by ICP-MS (QCLot: 4193077)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	94.4	84.0	120
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	84.0	120
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.4	86.0	120
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.6	85.0	120
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.0	84.0	120
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.6	85.0	120

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4193077) - continued								
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.2	85.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.1	84.0	120
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.0	89.0	120
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	107	84.0	120
EG020T: Total Metals by ICP-MS (QCLot: 4193115)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.7	89.6	118
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.3	89.2	116
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.3	87.8	114
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.2	85.8	115
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.5	88.4	111
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.9	87.4	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	88.1	120
EG035F: Dissolved Mercury by FIMS (QCLot: 4195695)								
EG035F-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00004	0.01 mg/L	96.1	87.6	115
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4193126)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	102	85.1	115
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4191375)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	96.8	86.2	111
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4191783)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	102	88.7	113
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4191374)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	94.0	90.5	110
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4193504)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	91.7	75.8	100
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4193505)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	94.1	70.0	110
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4192516)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	5 µg/L	64.0	36.2	90.2
EP068A: Organochlorine Pesticides (OC) (QCLot: 4192517)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	48.7	42.3	112
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	41.5	39.0	108
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	51.3	45.5	116
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	49.5	43.0	118
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	52.6	46.2	115
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	41.5	39.0	111
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	49.9	39.7	114
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	55.0	42.4	122

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4192517) - continued								
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	55.0	43.6	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	54.2	42.1	129
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	55.4	42.7	123
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	44.0	42.4	121
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	54.4	43.8	123
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	47.6	26.9	127
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	53.9	44.9	128
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	73.0	41.7	128
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	44.3	32.2	121
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	50.8	40.7	120
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	44.3	31.6	123
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	47.3	36.4	124
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	52.8	25.4	124
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4192517)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	43.8	38.8	110
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	48.8	34.6	115
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	1.2	0	20.1
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	40.4	27.8	102
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	52.1	46.1	122
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	48.5	46.6	118
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	38.1	26.8	110
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	48.2	38.8	119
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	51.6	45.0	119
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	52.6	44.6	118
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	43.5	30.2	112
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	53.3	43.2	123
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	55.5	41.1	119
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	47.4	34.4	125
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	41.9	19.9	123
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	50.7	38.0	121
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	51.4	39.5	121
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	50.0	39.7	119
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	22.6	0	137
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4192515)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	53.4	41.9	99.1
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	57.8	36.1	113
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	52.0	35.8	102
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	53.5	33.5	113
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	52.1	36.5	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4192515) - continued								
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	56.4	46.4	109
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	52.7	40.4	124
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	51.5	40.2	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	49.2	40.2	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	49.8	45.6	121
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	10 µg/L	50.1	43.2	123
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	49.6	47.3	121
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	48.5	44.8	123
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	41.4	38.8	120
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	51.4	39.4	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	44.8	40.1	123
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4192469)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	102	73.6	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4192514)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	368 µg/L	55.8	39.3	103
EP071: C15 - C28 Fraction	----	100	µg/L	<100	369 µg/L	81.2	47.2	122
EP071: C29 - C36 Fraction	----	50	µg/L	<50	297 µg/L	75.7	42.5	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4192469)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	105	73.9	115
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4192514)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	370 µg/L	59.6	42.0	104
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	482 µg/L	80.2	46.2	116
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	283 µg/L	73.8	24.7	137
EP080: BTEXN (QCLot: 4192469)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	112	84.1	114
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	114	81.0	115
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	100	84.4	113
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	114	84.3	114
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	103	86.5	111
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	104	77.0	118
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4193421)								
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	96.8	72.0	130
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	116	71.0	127
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	116	68.0	131
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	117	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4193421) - continued								
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	83.2	65.0	140
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	63.2	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4194459)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	96.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	95.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	98.6	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	101	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	92.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4193421)								
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	109	73.0	129
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	120	72.0	129
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	117	72.0	129
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	104	72.0	130
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	81.2	71.0	133
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	82.0	69.0	130
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	79.6	71.0	129
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	88.4	69.0	133
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	98.4	72.0	134
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	80.8	65.0	144
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	92.3	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4194459)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	104	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	99.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	104	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	105	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	112	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	105	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	112	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4193421)								
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	101	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	116	68.0	141

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4193421) - continued								
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	85.4	56.6	136
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	124	61.9	129
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	75.8	52.8	135
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	86.8	65.0	136
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	92.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4194459)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	109	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	108	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	111	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	103	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	115	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	102	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	111	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4193421)								
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	96.4	63.0	143
EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.004 µg/L	95.6	64.0	140
EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.004 µg/L	92.8	67.0	138
EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	0.004 µg/L	82.8	60.9	136
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4194459)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	102	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	112	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	101	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	101	71.4	144
EP231P: PFAS Sums (QCLot: 4193421)								
EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	----	----	----	----
EP262: Ethanolamines (QCLot: 4194734)								
EP262: Ethanolamine	141-43-5	1	µg/L	<1	10 µg/L	95.4	50.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP262: Ethanolamines (QCLot: 4194734) - continued								
EP262: Diethanolamine	111-42-2	1	µg/L	<1	10 µg/L	69.7	50.0	130
EP262: Methyl diethanolamine (MDEA)	105-59-9	1	µg/L	<1	10 µg/L	99.4	50.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4191784)							
EP2202113-001	MW03	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4191785)							
EP2202113-001	MW03	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4193077)							
EP2202062-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	103	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	98.9	70.0	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	98.5	70.0	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	102	70.0	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	93.6	70.0	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	98.2	70.0	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	103	70.0	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	103	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 4193115)							
EP2202034-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	91.7	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	93.9	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	91.7	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	91.5	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	98.2	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	91.9	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	91.0	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4195695)							
EP2202113-002	MW02	EG035F-LL: Mercury	7439-97-6	0.5 mg/L	91.7	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4193126)							
EP2202089-008	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	96.7	70.0	130

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4191375)							
EP2202113-003	BH27	EK055G: Ammonia as N	7664-41-7	1 mg/L	125	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4191783)							
EP2202113-001	MW03	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	98.2	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4191374)							
EP2202113-003	BH27	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	86.0	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4193504)							
EP2201996-022	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	97.1	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4193505)							
EP2201996-022	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	98.8	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4192469)							
EP2201996-022	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	103	77.0	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4192469)							
EP2201996-022	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	82.3	77.0	137
EP080: BTEXN (QCLot: 4192469)							
EP2201996-022	Anonymous	EP080: Benzene	71-43-2	20 µg/L	80.0	77.0	122
		EP080: Toluene	108-88-3	20 µg/L	86.0	73.5	126
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4194459)							
EP2202113-006	QC4	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	106	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	99.8	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	99.2	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	102	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	100	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	99.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4194459)							
EP2202113-006	QC4	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	102	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	101	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	108	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	109	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	110	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	97.2	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	97.6	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	106	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	106	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	97.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	116	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4194459)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4194459) - continued							
EP2202113-006	QC4	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	92.8	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	90.5	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	101	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	107	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	94.8	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	111	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4194459)							
EP2202113-006	QC4	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	104	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	110	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	96.0	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	91.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2202113**	Page	: 1 of 12
Client	: **Tetra Tech Coffey Pty Ltd**	Laboratory	: Environmental Division Perth
Contact	: Bernie Weekes	Telephone	: 08 9406 1307
Project	: 754-PEREN295751 Perdaman PSI	Date Samples Received	: 23-Feb-2022
Site	: ----	Issue Date	: 01-Mar-2022
Sampler	: SANJANA AUDIT	No. of samples received	: 8
Order number	: ----	No. of samples analysed	: 8

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2202113--001	MW03	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2202113--001	MW03	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
MW03, BH27, MW09	MW02, QC1,	----	----	----	24-Feb-2022	21-Feb-2022	**3**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	9	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	5	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Ethanolamines by LCMSMS	0	7	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	9	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	5	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**24-Feb-2022**	21-Feb-2022	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**24-Feb-2022**	21-Mar-2022	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**24-Feb-2022**	28-Feb-2022	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**24-Feb-2022**	07-Mar-2022	✓
ED038A: Acidity							
Clear Plastic Bottle - Natural (ED038) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**25-Feb-2022**	07-Mar-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**23-Feb-2022**	21-Mar-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**23-Feb-2022**	21-Mar-2022	✓
ED093F: Dissolved Major Cations							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (ED093F) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**24-Feb-2022**	21-Mar-2022	✓
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**24-Feb-2022**	20-Aug-2022	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) QC4	**21-Feb-2022**	**24-Feb-2022**	20-Aug-2022	✓	**24-Feb-2022**	20-Aug-2022	✓
EG035F: Dissolved Mercury by FIMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG035F-LL) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**25-Feb-2022**	21-Mar-2022	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG035T) QC4	**21-Feb-2022**	**----**	----	----	**25-Feb-2022**	21-Mar-2022	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**23-Feb-2022**	21-Mar-2022	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**23-Feb-2022**	23-Feb-2022	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**----**	----	----	**23-Feb-2022**	21-Mar-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**25-Feb-2022**	21-Mar-2022	✓	**25-Feb-2022**	21-Mar-2022	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) MW03, MW02, BH27, QC1, MW09	**21-Feb-2022**	**25-Feb-2022**	21-Mar-2022	✓	**25-Feb-2022**	21-Mar-2022	✓
EP066: Polychlorinated Biphenyls (PCB)							
Amber Glass Bottle - Unpreserved (EP066) MW03, QC1, QC4	**21-Feb-2022**	**24-Feb-2022**	28-Feb-2022	✓	**25-Feb-2022**	05-Apr-2022	✓
EP068A: Organochlorine Pesticides (OC)							
Amber Glass Bottle - Unpreserved (EP068) MW03, QC1, QC4	**21-Feb-2022**	**24-Feb-2022**	28-Feb-2022	✓	**25-Feb-2022**	05-Apr-2022	✓
EP068B: Organophosphorus Pesticides (OP)							
Amber Glass Bottle - Unpreserved (EP068) MW03, QC1, QC4	**21-Feb-2022**	**24-Feb-2022**	28-Feb-2022	✓	**25-Feb-2022**	05-Apr-2022	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) MW03, QC1, QC4	**21-Feb-2022**	**24-Feb-2022**	28-Feb-2022	✓	**25-Feb-2022**	05-Apr-2022	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) MW03, QC1, QC3, QC4	**21-Feb-2022**	**24-Feb-2022**	28-Feb-2022	✓	**25-Feb-2022**	05-Apr-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW03, QC1, QC3, QC4, TBW166	**21-Feb-2022**	**24-Feb-2022**	07-Mar-2022	✓	**24-Feb-2022**	07-Mar-2022	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) MW03, QC1, QC3, QC4	**21-Feb-2022**	**24-Feb-2022**	28-Feb-2022	✓	**25-Feb-2022**	05-Apr-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW03, QC1, QC3, QC4, TBW166	**21-Feb-2022**	**24-Feb-2022**	07-Mar-2022	✓	**24-Feb-2022**	07-Mar-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) MW03, QC1, QC3, QC4, TBW166	**21-Feb-2022**	**24-Feb-2022**	07-Mar-2022	✓	**24-Feb-2022**	07-Mar-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) MW03, MW02, BH27, QC1, QC4, MW09	**21-Feb-2022**	**24-Feb-2022**	20-Aug-2022	✓	**25-Feb-2022**	20-Aug-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-SUT) MW03, MW02, BH27, QC1, QC4, MW09	**21-Feb-2022**	**24-Feb-2022**	20-Aug-2022	✓	**25-Feb-2022**	20-Aug-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-SUT) MW03, MW02, BH27, QC1, QC4, MW09	**21-Feb-2022**	**24-Feb-2022**	20-Aug-2022	✓	**25-Feb-2022**	20-Aug-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) MW03, MW02, BH27, QC1, QC4, MW09	**21-Feb-2022**	**24-Feb-2022**	20-Aug-2022	✓	**25-Feb-2022**	20-Aug-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-SUT) MW03, MW02, BH27, QC1, QC4, MW09	**21-Feb-2022**	**24-Feb-2022**	20-Aug-2022	✓	**25-Feb-2022**	20-Aug-2022	✓
EP262: Ethanolamines							
Amber Bottle Unpreserved for Specialist Organics (EP262) MW03, MW02, BH27, QC1, QC4, MW09	**21-Feb-2022**	**----**	----	----	**25-Feb-2022**	28-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	3	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	9	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	3	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	3	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	11.76	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	5	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acidity as Calcium Carbonate	ED038	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	7	28.57	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	7	**28.57**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	17	**5.88**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Ammonia as N by Discrete analyser	EK055G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS - Low Level	EG035F-LL	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ethanolamines by LCMSMS	EP262	0	7	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	9	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	5	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Acidity as Calcium Carbonate	ED038	WATER	In house: Referenced to APHA 2310 B Acidity is determined by manual titration with a standardised alkali to an end-point pH of 8.3. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS - Low Level	EG035F-LL	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is concentrated, combined with an equal volume of reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Ethanolamines by LCMSMS	EP262	WATER	In house: LC-MSMS: Benzoyl derivatives of target compounds are analysed by LC/MSMS in ESI Positive Mode.

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office: Tetra Tech Coffey
Report Results to: Bernie Weekes
Invoices to: accounts.perth@tetratech.com
Mobile: 0407817762
Phone:
Email: bernie.weekes@coffey.com.@tetratech.com
Email: @tetratech.com

Project No: 754-PERGN295751
Task No:
Project Name: Perdaman PS I
Laboratory: ALS
Sampler's Name: Sanjana Audit
Project Manager: Bernie Weekes
Quote number (if different to current quoted prices):
Special Instructions:

Analysis Request Section

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	Interlab triplicate, please send to ARL
1	MW03	21/2/22	AM	water	various	3-days	
2	MW02	"	"	"		"	
3	BH27	"	"	"		"	
4	QC1	"	"	"		"	
	QC2	"	"	"		"	✓
5	QC3	"	"	"		"	
6	QC4	"	"	"		"	
7	TBW166	"	"	"	1 vial	"	
8	MW09	"	"	"	various	"	

NOTES

Analysis to be emailed by Bernie Weekes

Environmental Division Perth
Work Order Reference
EP2202113

Telephone : -- 61-8-9406 1301

RELINQUISHED BY		RECEIVED BY	
Name: Sanjana Audit	Date: 21/2/22 →	Name: Louflm	Date: 23/2
Coffey	Time:	Company: ALS	Time: 1130
Name:	Date: →	Name:	Date:
Company:	Time:	Company:	Time:

Sample Receipt Advice: (Lab Use Only)

- All Samples Recieved in Good Condition ☐
- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

APPENDIX E: WATER QUALITY RESULTS

Table 1
Groundwater Analytical Results
Perdaman Urea Project
754-PEREN296568

										Field_ID	BH12	BH22	BH27	BH31	MW01	MW10	MW02	MW03	MW04	MW05	MW06	MW07-2
										Sampled_Date	09-Feb-22	09-Feb-22	21-Feb-22	10-Feb-22	09-Feb-22	09-Feb-22	21-Feb-22	21-Feb-22	10-Feb-22	10-Feb-22	10-Feb-22	10-Feb-22
										SampleCode	EP2201691009	EP2201691007	EP2202113003	EP2201691008	EP2201691001	EP2201691006	EP2202113002	EP2202113001	EP2201691002	EP2201691003	EP2201691004	EP2201691018
										Lab_Report	EP2201691	EP2201691	EP2202113	EP2201691	EP2201691	EP2201691	EP2202113	EP2202113	EP2201691	EP2201691	EP2201691	EP2201691
			ASS	Ecological		Human Health																
			DWER ASS (2015)	ANZG (2018) Marine Water 95% LOSP Toxicant DGVs	PFAS NEMP 2020 Interim Marine 99%	DOH 2014 (WA) Domestic Non-Potable Groundwater Use (NPUG)	WHO 2008 (NPUG)	PFAS NEMP 2020 Recreational Water	NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand													
ChemName	**output unit**	**LOR**							**2-4m**	**4-8m**												
Physical Parameters																						
Electrical Conductivity @ 25C (lab)	µS/cm	1	NE	NE	NE	NE	NE	NE	NE	NE	180,000	6680	190,000	-	12,500	8930	177,000	122,000	-	-	-	-
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	NE	NE	NE	NE	166,000	4820	183,000	-	7800	5160	177,000	108,000	-	-	-	-
pH (lab)	pH_unit	0.01	NE	NE	NE	NE	NE	NE	NE	NE	7.2	7.76	7.1	-	7.52	8.31	7.26	7.54	-	-	-	-
Alkalinity			NE	NE	NE	NE	NE	NE	NE	NE												
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	105	563	73	-	463	344	60	117	-	-	-	-
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	<1	-	<1	<1	<1	<1	-	-	-	-
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	<1	-	<1	<1	<1	<1	-	-	-	-
Ions																						
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	1440	169	1490	-	350	30	1250	772	-	-	-	-
Cl:SO4	mg/L	-	<2	NE	NE	NE	NE	NE	NE	NE	13	24	15	-	276	8	12	9	-	-	-	-
Chloride	mg/L	1	NE	NE	NE	250	NE	NE	NE	NE	84,900	2060	100,000	-	3860	2590	86,900	50,900	-	-	-	-
Sulfate as SO4 - Turbidimetric	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	6,500	87	6,880	-	14	342	7,270	5,580	-	-	-	-
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	1800	53	2160	-	25	94	1830	1260	-	-	-	-
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	48,400	1120	61,500	-	1740	1690	51,000	33,200	-	-	-	-
Ionic Balance	%	0.01	NE	NE	NE	NE	NE	NE	NE	NE	2.38	1.04	5.34	-	1.22	1.4	3.16	6.53	-	-	-	-
Anions Total	meq/L	0.01	NE	NE	NE	NE	NE	NE	NE	NE	2530	71.2	2960	-	118	87	2600	1550	-	-	-	-
Cations Total	meq/L	0.01	NE	NE	NE	NE	NE	NE	NE	NE	2660	72.7	3300	-	121	84.6	2770	1770	-	-	-	-
Inorganics																						
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	105	563	73	-	463	344	60	117	-	-	-	-
Total Phosphorus as P (Organic Phosphate as P)	mg/L	0.01	NE	NE	NE	NE	NE	NE	NE	NE	0.06	0.28	0.46	0.86	-	0.02	0.08	0.11	-	0.08	0.06	-
Nutrients																						
Ammonia as N	mg/L	0.01	NE	0.91	NE	NE	NE	NE	NE	NE	0.74	3.73	0.07	0.13	-	<0.01	<0.05	<0.05	-	<0.01	9.19	-
Nitrite + Nitrate as N	mg/L	0.01	NE	NE	NE	NE	NE	NE	NE	NE	<0.01	0.02	1.24	<0.01	-	9.17	0.94	0.19	-	<0.01	0.83	-
Nitrate (as NO3-N)	mg/L	0.01	NE	NE	NE	NE	NE	NE	NE	NE	<0.01	0.02	1.22	<0.01	-	9.16	0.92	0.18	-	<0.01	0.2	-
Nitrite (as NO2-N)	mg/L	0.01	NE	NE	NE	NE	NE	NE	NE	NE	<0.01	<0.01	0.02	<0.01	-	0.01	0.02	0.01	-	<0.01	0.63	-
Nitrogen (Total)	mg/L	0.1	NE	NE	NE	NE	NE	NE	NE	NE	2.4	61.1	2.8	63	-	9.8	2.3	0.9	-	0.5	11.9	-
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1	NE	NE	NE	NE	NE	NE	NE	NE	2.4	61.1	1.6	63	-	0.6	1.4	0.7	-	0.5	11.1	-
PAH																						
Acenaphthene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
Acenaphthylene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
Anthracene	µg/L	1	NE	0.4	NE	NE	NE	NE	NE	NE	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
Benz(a)anthracene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
Benzo(a) pyrene	µg/L	0.5	NE	0.2	NE	0.1	7	NE	NE	NE	<0.5	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5	-
Benzo(g,h,i)perylene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
Benzo(k)fluoranthene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
Chrysene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
Benzo(b+j)fluoranthene	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-
Dibenz(a,h)anthracene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
Fluoranthene	µg/L	1	NE	1.4	NE	NE	NE	NE	NE	NE	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
Fluorene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
Indeno(1,2,3-c,d)pyrene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
Phenanthrene	µg/L	1	NE	2	NE	NE	NE	NE	NE	NE	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
Pyrene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
PAHs (Sum of total)	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	<0.5	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5	-
Metals																						
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	5260	172	6020	-	335	88	5420	3120	-	-	-	-
Arsenic	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (Filtered)	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.02	0.004	<0.02	0.002	0.005	<0.001	<0.02	<0.02	-	0.003	0.001	<0.02
Cadmium	mg/L	0.0001	NE	0.0055	NE	0.02	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Filtered)	mg/L	0.0001	NE	0.0055	NE	0.02	NE	NE	NE	NE	<0.002	<0.0001	<0.002	<0.0001	<0.0001	<0.0001	<0.002	<0.002	-	<0.0001	0.0002	<0.002
Chromium (III+VI)	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (III+VI) (Filtered)	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.02	<0.001	<0.02	<0.001	<0.001	<0.001	<0.02	<0.02	-	<0.001	<0.001	<0.02
Copper	mg/L	0.001	NE	0.0013	NE	20	20	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Copper (Filtered)	mg/L	0.001	NE	0.0013	NE	20	20	NE	NE	NE	<0.02	<0.001	<0.02	0.01	<0.001	<0.001	<0.02	<0.02	-	<0.001	<0.001	<0.02
Lead	mg/L	0.001	NE	0.0044	NE	0.1	0.1	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Filtered)	mg/L	0.001	NE	0.0044	NE	0.1	0.1	NE	NE	NE	<0.02	<0.001	<0.02	<0.001	<0.001	<0.001	<0.02	<0.02	-	<0.001	<0.001	<0.02
Mercury	mg/L	0.00004	NE	0.0004	NE	0.01	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (Filtered)	mg/L	0.00004	NE	0.0004	NE	0.01	NE	NE	NE	NE	<0.0002	<0.00004	<0.0002	<0.00004	<0.00004	<0.00004	<0.0002	<0.0002	-	<0.00004	<0.00004	<0.00004
Nickel	mg/L	0.001	NE	0.07	NE	0.2	0.7	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (Filtered)	mg/L	0.001	NE	0.07	NE	0.2	0.7	NE	NE	NE	<0.02	0.004	<0.02	0.028	0.003	<0.001	<0.02	<0.02	-	0.003	0.005	<0.02
Zinc	mg/L	0.005	NE	0.015	NE	3	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (Filtered)	mg/L	0.005	NE	0.015	NE	3	NE	NE	NE	NE	<0.1	0.009	<0.1	0.008	<0.005	<0.005	<0.1	<0.1	-	<0.005	0.035	<0.1
Aluminium (Filtered)	mg/L	0.01	>1	NE	NE	0.2	NE	NE	NE	NE	<0.2	0.05	<0.2	-	<0.01	0.02	<0.2	<0.2	-	-	-	-
Iron (Filtered)	mg/L	0.05	NE	NE	NE	0.3	NE	NE	NE	NE	8.39	5.39	<1	-	15.8	<0.05	<1	<1	-	-	-	-
Manganese (Filtered)	mg/L	0.001	NE	NE	NE	5	NE	NE	NE	NE	14.5	5.74	0.657	-	17.4	<0.001	0.033	<0.02	-	-	-	-
Perfluoroalkane Sulfonic Acids																						
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	0.0188	0.0416	0.0071	0.512	0.0101	0.0113	0.0012	0.0047	-	<0.0005	<0.0005	0.0011
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	0.0086	0.368	0.0064	0.256	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	0.126	2.37	0.0285	1.29	<0.0005	0.0011	<0.0005	0.0016	-	0.0011	0.0006	0.0006
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	0.0039	0.0614	0.0026	0.072	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	NE	0.00023	NE	NE	NE	NE	NE	0.0898	0.726	0.0269	0.595	0.0044	0.0017	<0.0002	<0.0002	-	0.0045	0.0033	<0.0002
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids																						
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	NE	NE	NE	NE	0.0143	0.207	0.0171	0.0768	<0.002	0.0752	0.0647	0.299	-	<0.002	0.0435	0.0306
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	0.018	0.425	0.0272	0.346	<0.0005	0.14	0.104	0.562	-	0.0012	<0.0005	0.0223
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	0.0296	0.933	0.0319	0.839	<0.0005	0.122	0.0264	0.289	-	0.0038	0.0019	0.013
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	0.0095	0.271	0.0036	0.209	<0.0005	0.137	0.002	0.104	-	0.0018	0.001	0.0064
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	NE	NE	19	NE	NE	10	NE	NE	0.0108	0.232	0.0034	0.186	0.0023	0.0734	<0.0005	0.0109	-	0.0028	0.0102	0.0016
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	0.0012	0.0131	<0.0005	0.0098	0.0007	0.0226	<0.0005	0.0006	-	0.0027	0.0052	<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	0.0012	0.0038	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	0.0006	<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005
(n:2) Fluorotelomer Sulfonic Acids			NE	NE	NE	NE	NE	NE	NE	NE												
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	0.002	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	0.025	0.432	0.006	0.464	0.004	<0.001	<0.001	<0.001	-	0.007	0.005	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	0.003	<0.001	0.005	0.001	<0.001	<0.001	<0.001	-	<0.001	0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides			NE	NE	NE	NE	NE	NE	NE	NE												
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001
PFAS			NE	NE	NE	NE	NE	NE	NE	NE												
Sum of PFHxS and PFOS	µg/L	0.0002	NE	NE	NE	NE	NE	2	NE	NE	0.216	3.1	0.0554	1.88	0.0044	0.0028	<0.0002	0.0016	-	0.0056	0.0039	0.0006
Sum of PFAS (WA DER List)_	µg/L	0.0002	NE	NE	NE	NE	NE	NE	NE	NE	0.342	5.64	0.152	4.52	0.0218	0.562	0.198	1.27	-	0.0222	0.0665	0.0756
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	NE	NE	NE	NE	0.356	6.09	0.161	4.86	0.0225	0.584	0.198	1.27	-	0.0261	0.0761	0.0756
OCP																						
4,4-DDE	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
a-BHC	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Aldrin	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Aldrin + Dieldrin	µg/L	0.5	NE	NE	NE	3	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
b-BHC	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
chlordane	µg/L	0.5	NE	NE	NE	20	2	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
d-BHC	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
DDD	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
DDT	µg/L	2	NE	NE	NE	90	NE	NE	NE	NE	-	-	-	<2	-	-	-	<2	<2	<2	<2	-
Dieldrin	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Endosulfan I	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Endosulfan II	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Endosulfan sulphate	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Endrin	µg/L	0.5	NE	0.008	NE	NE	6	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Endrin aldehyde	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Endrin ketone	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
g-BHC (Lindane)	µg/L	0.5	NE	NE	NE	100	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Heptachlor	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
DDT+DDE+DDD	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Heptachlor epoxide	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Hexachlorobenzene	µg/L	0.5	NE	0.1	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Methoxychlor	µg/L	2	NE	NE	NE	NE	200	NE	NE	NE	-	-	-	<2	-	-	-	<2	<2	<2	<2	-
Pesticides																						
Demeton-S-methyl	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Fenamiphos	µg/L	0.5	NE	NE	NE	5	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Parathion	µg/L	2	NE	NE	NE	200	NE	NE	NE	NE	-	-	-	<2	-	-	-	<2	<2	<2	<2	-
Pirimphos-ethyl	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Organochlorine Pesticides																						
Chlordane (cis)	µg/L	0.5	NE	NE	NE	NE	2	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Chlordane (trans)	µg/L	0.5	NE	NE	NE	NE	2	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Organophosphorous Pesticides																						
Azinophos methyl	µg/L	0.5	NE	NE	NE	300	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Bromophos-ethyl	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Carbophenothion	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Chlorfenvinphos	µg/L	0.5	NE	NE	NE	20	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Chlorpyrifos	µg/L	0.5	NE	0.009	NE	100	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Chlorpyrifos-methyl	mg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.0005	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	-
Diazinon	µg/L	0.5	NE	NE	NE	40	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Dichlorvos	µg/L	0.5	NE	NE	NE	50	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Dimethoate	µg/L	0.5	NE	NE	NE	70	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Ethion	µg/L	0.5	NE	NE	NE	40	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Fenthion	µg/L	0.5	NE	NE	NE	70	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Malathion	µg/L	0.5	NE	NE	NE	700	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Methyl parathion	µg/L	2	NE	NE	NE	7	NE	NE	NE	NE	-	-	-	<2	-	-	-	<2	<2	<2	<2	-
Monocrotophos	µg/L	2	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<2	-	-	-	<2	<2	<2	<2	-
Prothiofos	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	-
Other																						
Acidity (as CaCO3)	mg/L	1	>40	NE	NE	NE	NE	NE	NE	NE	53	32	36	-	53	<1	30	27	-	-	-	-
Diethanolamine	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	-	-	-	<0.01
Ethanolamine	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	-	-	-	<0.01
Methyldiethanolamine	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	-	-	-	<0.01
PCBs																						
PCBs (Sum of total)	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-	<1	-	-	-	<1	<1	<1	<1	-
Total Recoverable Hydrocarbons			NE	NE	NE	NE	NE	NE	NE	NE												
C10 - C40 (Sum of total)	mg/L	0.1	NE	NE	NE	NE	NE	NE	NE	NE	<0.1	0.22	-	11.9	-	<0.1	-	<0.1	-	<0.1	<0.1	-
Polycyclic Aromatic Hydrocarbons																						
Naphthalene	µg/L	1	NE	70	NE	NE	NE	NE	NL	NL	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
Benzo(a)pyrene TEQ calc (Zero)	mg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	<0.0005	-
BTEX																						
Benzene	µg/L	1	NE	700	NE	10	100	NE	5000	5000	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
Toluene	µg/L	2	NE	180	NE	25	7000	NE	NL	NL	<2	<2	-	<2	-	<2	-	<2	-	<2	<2	-
Ethylbenzene	µg/L	2	NE	80	NE	3	3000	NE	NL	NL	<2	<2	-	<2	-	<2	-	<2	-	<2	<2	-
Xylene (m & p)	µg/L	2	NE	NE	NE	NE	5000	NE	NE	NE	<2	<2	-	<2	-	<2	-	<2	-	<2	<2	-
Xylene (o)	µg/L	2	NE	NE	NE	NE	5000	NE	NE	NE	<2	<2	-	<2	-	<2	-	<2	-	<2	<2	-
Xylene Total	µg/L	2	NE	NE	NE	20	5000	NE	NL	NL	<2	<2	-	<2	-	<2	-	<2	-	<2	<2	-
Total BTEX	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	-
TPH																						
F1 (C6-C10) less BTEX	mg/L	0.02	NE	NE	NE	NE	NE	NE	6	6	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	<0.02	-
F2 C10-C16 (minus Naphthalene)	mg/L	0.1	NE	NE	NE	NE	NE	NE	NL	NL	<0.1	<0.1	-	11.6	-	<0.1	-	<0.1	-	<0.1	<0.1	-
C6 - C9	mg/L	0.02	NE	NE	NE	NE	NE	NE	NE	NE	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	<0.02	-
C10 - C14	mg/L	0.05	NE	NE	NE	NE	NE	NE	NE	NE	<0.05	0.05	-	9.22	-	<0.05	-	<0.05	-	<0.05	<0.05	-
C15 - C28	mg/L	0.1	NE	NE	NE	NE	NE	NE	NE	NE	<0.1	0.24	-	2.94	-	<0.1	-	<0.1	-	<0.1	<0.1	-
C29-C36	mg/L	0.05	NE	NE	NE	NE	NE	NE	NE	NE	<0.05	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05	-
+C10 - C36 (Sum of total)	mg/L	0.05	NE	NE	NE	NE	NE	NE	NE	NE	<0.05	0.29	-	12.2	-	<0.05	-	<0.05	-	<0.05	<0.05	-
F1 (C6-C10_)	mg/L	0.02	NE	NE	NE	NE	NE	NE	NE	NE	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	<0.02	-
F2 (C10-C16 Hydrocarbons)	mg/L	0.1	NE	NE	NE	NE	0.9	NE	NE	NE	<0.1	<0.1	-	11.6	-	<0.1	-	<0.1	-	<0.1	<0.1	-
F3 (C16-C34 Hydrocarbons)	mg/L	0.1	NE	NE	NE	NE	0.9	NE	NE	NE	<0.1	0.22	-	0.27	-	<0.1	-	<0.1	-	<0.1	<0.1	-
C34-C40	mg/L	0.1	NE	NE	NE	NE	NE	NE	NE	NE	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-

Table 1
Groundwater Analytical Results
Perdaman Urea Project
754-PEREN296568

TETRA TECH COFFEY

											Field_ID	MW08	MW08-2	MW09
											Sampled_Date	09-Feb-22	10-Feb-22	21-Feb-22
											SampleCode	EP2201691005	EP2201691019	EP2202113008
											Lab_Report	EP2201691	EP2201691	EP2202113
			ASS	Ecological		Human Health								
			DWER ASS (2015)	ANZG (2018) Marine Water 95% LOSP Toxicant DGVs	PFAS NEMP 2020 Interim Marine 99%	DOH 2014 (WA) Domestic Non-Potable Groundwater Use (NPUG)	WHO 2008 (NPUG)	PFAS NEMP 2020 Recreational Water	NEPM 2013 Table 1A(4) Comm/Ind HSLD GW for Vapour Intrusion, Sand				
ChemName	**output unit**	**LOR**							**2-4m**	**4-8m**			
Physical Parameters													
Electrical Conductivity @ 25C (lab)	µS/cm	1	NE	NE	NE	NE	NE	NE	NE	NE	162,000	143,000	135,000
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	NE	NE	NE	NE	139,000	143,000	124,000
pH (lab)	pH_unit	0.01	NE	NE	NE	NE	NE	NE	NE	NE	7.5	7.53	7.35
Alkalinity			NE	NE	NE	NE	NE	NE	NE	NE			
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	131	122	97
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	<1
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	<1
Ions													
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	1500	1500	1190
Cl:SO4	mg/L	-	<2	NE	NE	NE	NE	NE	NE	NE	9	9	10
Chloride	mg/L	1	NE	NE	NE	250	NE	NE	NE	NE	70,700	67,200	62,600
Sulfate as SO4 - Turbidimetric	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	8,050	7,670	6,440
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	1540	1540	1430
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	42,500	40,000	41,400
Ionic Balance	%	0.01	NE	NE	NE	NE	NE	NE	NE	NE	4.4	3.82	8.51
Anions Total	meq/L	0.01	NE	NE	NE	NE	NE	NE	NE	NE	2160	2060	1900
Cations Total	meq/L	0.01	NE	NE	NE	NE	NE	NE	NE	NE	2360	2220	2260
Inorganics													
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	131	122	97
Total Phosphorus as P (Organic Phosphate as P)	mg/L	0.01	NE	NE	NE	NE	NE	NE	NE	NE	0.85	0.1	0.39
Nutrients													
Ammonia as N	mg/L	0.01	NE	0.91	NE	NE	NE	NE	NE	NE	0.74	0.55	<0.05
Nitrite + Nitrate as N	mg/L	0.01	NE	NE	NE	NE	NE	NE	NE	NE	5.54	6.16	0.07
Nitrate (as NO3-N)	mg/L	0.01	NE	NE	NE	NE	NE	NE	NE	NE	5.48	6.13	0.05
Nitrite (as NO2-N)	mg/L	0.01	NE	NE	NE	NE	NE	NE	NE	NE	0.06	0.03	0.02
Nitrogen (Total)	mg/L	0.1	NE	NE	NE	NE	NE	NE	NE	NE	9.5	8.4	1.4
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1	NE	NE	NE	NE	NE	NE	NE	NE	4	2.2	1.3
PAH													
Acenaphthene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-
Acenaphthylene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-
Anthracene	µg/L	1	NE	0.4	NE	NE	NE	NE	NE	NE	<1	<1	-
Benz(a)anthracene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-
Benzo(a) pyrene	µg/L	0.5	NE	0.2	NE	0.1	7	NE	NE	NE	<0.5	<0.5	-
Benzo(g,h,i)perylene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-
Benzo(k)fluoranthene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-
Chrysene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-
Benzo(b+j)fluoranthene	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	<0.001	-
Dibenz(a,h)anthracene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-
Fluoranthene	µg/L	1	NE	1.4	NE	NE	NE	NE	NE	NE	<1	<1	-
Fluorene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-
Indeno(1,2,3-c,d)pyrene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-
Phenanthrene	µg/L	1	NE	2	NE	NE	NE	NE	NE	NE	<1	<1	-
Pyrene	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-
PAHs (Sum of total)	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	<0.5	<0.5	-
Metals													
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	4870	4460	4360
Arsenic	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Arsenic (Filtered)	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.02	<0.02	<0.02
Cadmium	mg/L	0.0001	NE	0.0055	NE	0.02	NE	NE	NE	NE	-	-	-
Cadmium (Filtered)	mg/L	0.0001	NE	0.0055	NE	0.02	NE	NE	NE	NE	<0.002	<0.002	<0.002
Chromium (III+VI)	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Chromium (III+VI) (Filtered)	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.02	<0.02	<0.02
Copper	mg/L	0.001	NE	0.0013	NE	20	20	NE	NE	NE	-	-	-
Copper (Filtered)	mg/L	0.001	NE	0.0013	NE	20	20	NE	NE	NE	<0.02	<0.02	<0.02
Lead	mg/L	0.001	NE	0.0044	NE	0.1	0.1	NE	NE	NE	-	-	-
Lead (Filtered)	mg/L	0.001	NE	0.0044	NE	0.1	0.1	NE	NE	NE	<0.02	<0.02	<0.02
Mercury	mg/L	0.00004	NE	0.0004	NE	0.01	NE	NE	NE	NE	-	-	-
Mercury (Filtered)	mg/L	0.00004	NE	0.0004	NE	0.01	NE	NE	NE	NE	<0.0002	<0.0002	<0.0002
Nickel	mg/L	0.001	NE	0.07	NE	0.2	0.7	NE	NE	NE	-	-	-
Nickel (Filtered)	mg/L	0.001	NE	0.07	NE	0.2	0.7	NE	NE	NE	<0.02	<0.02	<0.02
Zinc	mg/L	0.005	NE	0.015	NE	3	NE	NE	NE	NE	-	-	-
Zinc (Filtered)	mg/L	0.005	NE	0.015	NE	3	NE	NE	NE	NE	<0.1	<0.1	<0.1
Aluminium (Filtered)	mg/L	0.01	>1	NE	NE	0.2	NE	NE	NE	NE	<0.2	<0.2	<0.2
Iron (Filtered)	mg/L	0.05	NE	NE	NE	0.3	NE	NE	NE	NE	<1	<1	<1
Manganese (Filtered)	mg/L	0.001	NE	NE	NE	5	NE	NE	NE	NE	0.39	0.069	1.35
Perfluoroalkane Sulfonic Acids													
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	0.0057	0.0014	0.0011
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	0.0024	0.0017	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	NE	0.00023	NE	NE	NE	NE	NE	0.0013	0.0009	<0.0002
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids													
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	NE	NE	NE	NE	0.0383	0.0171	0.0648
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	0.0603	0.025	0.114
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	0.0349	0.0132	0.0558
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	0.0239	0.0071	0.0012
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	NE	NE	19	NE	NE	10	NE	NE	0.0048	0.0013	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	0.0015	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005
(n:2) Fluorotelomer Sulfonic Acids			NE	NE	NE	NE	NE	NE	NE	NE			
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides			NE	NE	NE	NE	NE	NE	NE	NE			
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.001	<0.001	<0.001
PFAS			NE	NE	NE	NE	NE	NE	NE	NE			
Sum of PFHxS and PFOS	µg/L	0.0002	NE	NE	NE	NE	NE	2	NE	NE	0.0037	0.0026	<0.0002
Sum of PFAS (WA DER List)_	µg/L	0.0002	NE	NE	NE	NE	NE	NE	NE	NE	0.172	0.0677	0.237
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	NE	NE	NE	NE	0.173	0.0677	0.237
OCP													
4,4-DDE	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
a-BHC	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Aldrin	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Aldrin + Dieldrin	µg/L	0.5	NE	NE	NE	3	NE	NE	NE	NE	-	-	-
b-BHC	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
chlordane	µg/L	0.5	NE	NE	NE	20	2	NE	NE	NE	-	-	-
d-BHC	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
DDD	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
DDT	µg/L	2	NE	NE	NE	90	NE	NE	NE	NE	-	-	-
Dieldrin	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Endosulfan I	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Endosulfan II	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Endosulfan sulphate	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Endrin	µg/L	0.5	NE	0.008	NE	NE	6	NE	NE	NE	-	-	-
Endrin aldehyde	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Endrin ketone	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
g-BHC (Lindane)	µg/L	0.5	NE	NE	NE	100	NE	NE	NE	NE	-	-	-
Heptachlor	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
DDT+DDE+DDD	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Heptachlor epoxide	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Hexachlorobenzene	µg/L	0.5	NE	0.1	NE	NE	NE	NE	NE	NE	-	-	-
Methoxychlor	µg/L	2	NE	NE	NE	NE	200	NE	NE	NE	-	-	-
Pesticides													
Demeton-S-methyl	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Fenamiphos	µg/L	0.5	NE	NE	NE	5	NE	NE	NE	NE	-	-	-
Parathion	µg/L	2	NE	NE	NE	200	NE	NE	NE	NE	-	-	-
Pirimphos-ethyl	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Organochlorine Pesticides													
Chlordane (cis)	µg/L	0.5	NE	NE	NE	NE	2	NE	NE	NE	-	-	-
Chlordane (trans)	µg/L	0.5	NE	NE	NE	NE	2	NE	NE	NE	-	-	-
Organophosphorous Pesticides													
Azinophos methyl	µg/L	0.5	NE	NE	NE	300	NE	NE	NE	NE	-	-	-
Bromophos-ethyl	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Carbophenothion	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Chlorfenvinphos	µg/L	0.5	NE	NE	NE	20	NE	NE	NE	NE	-	-	-
Chlorpyrifos	µg/L	0.5	NE	0.009	NE	100	NE	NE	NE	NE	-	-	-
Chlorpyrifos-methyl	mg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Diazinon	µg/L	0.5	NE	NE	NE	40	NE	NE	NE	NE	-	-	-
Dichlorvos	µg/L	0.5	NE	NE	NE	50	NE	NE	NE	NE	-	-	-
Dimethoate	µg/L	0.5	NE	NE	NE	70	NE	NE	NE	NE	-	-	-
Ethion	µg/L	0.5	NE	NE	NE	40	NE	NE	NE	NE	-	-	-
Fenthion	µg/L	0.5	NE	NE	NE	70	NE	NE	NE	NE	-	-	-
Malathion	µg/L	0.5	NE	NE	NE	700	NE	NE	NE	NE	-	-	-
Methyl parathion	µg/L	2	NE	NE	NE	7	NE	NE	NE	NE	-	-	-
Monocrotophos	µg/L	2	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Prothiofos	µg/L	0.5	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Other													
Acidity (as CaCO3)	mg/L	1	>40	NE	NE	NE	NE	NE	NE	NE	45	34	32
Diethanolamine	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.01	<0.01	<0.01
Ethanolamine	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.01	<0.01	<0.01
Methyldiethanolamine	mg/L	0.001	NE	NE	NE	NE	NE	NE	NE	NE	<0.01	<0.01	<0.01
PCBs													
PCBs (Sum of total)	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	-	-	-
Total Recoverable Hydrocarbons			NE	NE	NE	NE	NE	NE	NE	NE			
C10 - C40 (Sum of total)	mg/L	0.1	NE	NE	NE	NE	NE	NE	NE	NE	<0.1	<0.1	-
Polycyclic Aromatic Hydrocarbons													
Naphthalene	µg/L	1	NE	70	NE	NE	NE	NE	NL	NL	<1	<1	-
Benzo(a)pyrene TEQ calc (Zero)	mg/L	0.0005	NE	NE	NE	NE	NE	NE	NE	NE	<0.0005	<0.0005	-
BTEX													
Benzene	µg/L	1	NE	700	NE	10	100	NE	5000	5000	<1	<1	-
Toluene	µg/L	2	NE	180	NE	25	7000	NE	NL	NL	<2	<2	-
Ethylbenzene	µg/L	2	NE	80	NE	3	3000	NE	NL	NL	<2	<2	-
Xylene (m & p)	µg/L	2	NE	NE	NE	NE	5000	NE	NE	NE	<2	<2	-
Xylene (o)	µg/L	2	NE	NE	NE	NE	5000	NE	NE	NE	<2	<2	-
Xylene Total	µg/L	2	NE	NE	NE	20	5000	NE	NL	NL	<2	<2	-
Total BTEX	µg/L	1	NE	NE	NE	NE	NE	NE	NE	NE	<1	<1	-
TPH													
F1 (C6-C10) less BTEX	mg/L	0.02	NE	NE	NE	NE	NE	NE	6	6	<0.02	<0.02	-
F2 C10-C16 (minus Naphthalene)	mg/L	0.1	NE	NE	NE	NE	NE	NE	NL	NL	<0.1	<0.1	-
C6 - C9	mg/L	0.02	NE	NE	NE	NE	NE	NE	NE	NE	<0.02	<0.02	-
C10 - C14	mg/L	0.05	NE	NE	NE	NE	NE	NE	NE	NE	<0.05	<0.05	-
C15 - C28	mg/L	0.1	NE	NE	NE	NE	NE	NE	NE	NE	<0.1	<0.1	-
C29-C36	mg/L	0.05	NE	NE	NE	NE	NE	NE	NE	NE	<0.05	<0.05	-
+C10 - C36 (Sum of total)	mg/L	0.05	NE	NE	NE	NE	NE	NE	NE	NE	<0.05	<0.05	-
F1 (C6-C10_)	mg/L	0.02	NE	NE	NE	NE	NE	NE	NE	NE	<0.02	<0.02	-
F2 (C10-C16 Hydrocarbons)	mg/L	0.1	NE	NE	NE	NE	0.9	NE	NE	NE	<0.1	<0.1	-
F3 (C16-C34 Hydrocarbons)	mg/L	0.1	NE	NE	NE	NE	0.9	NE	NE	NE	<0.1	<0.1	-
C34-C40	mg/L	0.1	NE	NE	NE	NE	NE	NE	NE	NE	<0.1	<0.1	-

Table 2
Surface Water Analytical Results
Perdaman Urea Project
754-PEREN595751

TETRA TECH COFFEY

						Field_ID	SW4	SW5
						Sampled_Date_Time	29-Jan-22	29-Jan-22
						SampleCode	EP2201196031	EP2201196032
						Lab_Report_Number	EP2201196	EP2201196
ChemName	**output unit**	**LOR**	ANZECC 2000 Marine water 95% *(including Pilbara & Kimberley specific assessment criteria from DWER 2021)*	DOH 2014 (WA) Domestic Non-Potable Groundwater Use (NPUG)	PFAS NEMP 2018 Table 1 Health Recreational Water	PFAS NEMP 2018 Table 5 Interim marine 99%		
Nutrients								
Ammonia as N	mg/L	**0.01**	**0.91**	**0.5**	NE	NE	**0.06**	**0.1**
Nitrite + Nitrate as N	mg/L	**0.01**	NE	NE	NE	NE	<0.05	<0.01
Nitrate (as NO3-N)	mg/L	**0.01**	NE	**500**	NE	NE	<0.05	<0.01
Nitrite (as NO2-N)	mg/L	**0.01**	NE	**30**	NE	NE	<0.01	<0.01
Nitrogen (Total)	mg/L	**0.1**	**0.25**	NE	NE	NE	**2.8**	**1**
Total Kjeldahl Nitrogen (TKN)	mg/L	**0.1**	NE	NE	NE	NE	**2.8**	**1**
Inorganics								
Total Phosphorus as P (Organic Phosphate as P)	mg/L	**0.01**	**0.02**	NE	NE	NE	**0.22**	**0.07**
Metals								
Arsenic	mg/L	**0.001**	NE	NE	NE	NE	<0.052	<0.021
Cadmium	mg/L	**0.0001**	**0.0055**	**0.02**	NE	NE	<0.0052	<0.0021
Chromium (III+VI)	mg/L	**0.001**	NE	NE	NE	NE	<0.052	<0.021
Copper	mg/L	**0.001**	**0.0013**	**20**	NE	NE	<0.052	<0.021
Lead	mg/L	**0.001**	**0.0044**	**0.1**	NE	NE	<0.052	<0.021
Mercury	mg/L	**0.00004**	**0.0004**	**0.01**	NE	NE	<0.0002	<0.0002
Nickel	mg/L	**0.001**	**0.07**	**0.2**	NE	NE	<0.052	<0.021
Zinc	mg/L	**0.005**	**0.015**	**3**	NE	NE	<0.262	<0.105
Perfluoroalkane Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	µg/L	**0.0005**	NE	NE	NE	NE	**0.002**	0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	**0.0005**	NE	NE	NE	NE	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	**0.0005**	NE	NE	NE	NE	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	**0.0005**	NE	NE	NE	NE	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	**0.0002**	NE	NE	NE	**0.00023**	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	µg/L	**0.0005**	NE	NE	NE	NE	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	µg/L	**0.002**	NE	NE	NE	NE	**0.123**	**0.0165**
Perfluoropentanoic acid (PFPeA)	µg/L	**0.0005**	NE	NE	NE	NE	**0.698**	**0.0765**
Perfluorohexanoic acid (PFHxA)	µg/L	**0.0005**	NE	NE	NE	NE	**0.0586**	**0.0611**
Perfluoroheptanoic acid (PFHpA)	µg/L	**0.0005**	NE	NE	NE	NE	**0.018**	**0.0178**
Perfluorooctanoic acid (PFOA)	µg/L	**0.0005**	NE	NE	**5.6**	**19**	**0.0017**	**0.0029**
Perfluorononanoic acid (PFNA)	µg/L	**0.0005**	NE	NE	NE	NE	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	**0.0005**	NE	NE	NE	NE	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	**0.0005**	NE	NE	NE	NE	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	**0.0005**	NE	NE	NE	NE	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	**0.0005**	NE	NE	NE	NE	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	**0.0005**	NE	NE	NE	NE	<0.0005	<0.0005
(n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	**0.001**	NE	NE	NE	NE	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	**0.001**	NE	NE	NE	NE	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	**0.001**	NE	NE	NE	NE	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	**0.001**	NE	NE	NE	NE	<0.001	<0.001
Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	µg/L	**0.0005**	NE	NE	NE	NE	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	**0.001**	NE	NE	NE	NE	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	**0.001**	NE	NE	NE	NE	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	**0.0005**	NE	NE	NE	NE	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	**0.0005**	NE	NE	NE	NE	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	**0.001**	NE	NE	NE	NE	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	**0.001**	NE	NE	NE	NE	<0.001	<0.001
PFAS								
Sum of PFAS (WA DER List)_	µg/L	**0.0002**	NE	NE	NE	NE	**0.901**	**0.175**
Sum of PFHxS and PFOS	µg/L	**0.0002**	NE	NE	**0.7**	NE	<0.0002	<0.0002
Sum of PFAS	µg/L	**0.0002**	NE	NE	NE	NE	**0.901**	**0.175**
Other								
Diethanolamine	mg/L	**0.001**	NE	NE	NE	NE	<0.01	<0.01
Ethanolamine	mg/L	**0.001**	NE	NE	NE	NE	<0.01	<0.01
Methyldiethanolamine	mg/L	**0.001**	NE	NE	NE	NE	<0.01	<0.01
PCBs								
PCBs (Sum of total)	µg/L	**1**	NE	NE	NE	NE	<1	<1

Table 3
QAQC - Field Blanks, Rinsate and Trip Blanks
Perdaman Urea Project
754-PEREN295751

TETRA TECH COFFEY

		Lab Report Number	EP2200878	EP2200878	EP2201003	EP2201003	EP2201008	EP2201008	EP2201086	EP2201086	EP2201074	EP2201074	EP2201196	EP2201196	EP2200878	EP2201691
		Field ID	QC1	QC2	QC11	QC12	QC17	QC18	QC19	QC20	QC30	QC31	QC38	QC39	TBW44	TBW46
		Sampled Date/Time	24-01-22 12:30	24-01-22	25-01-22	25-01-22	26-01-22	26-01-22	27-01-22	27-01-22	28-01-22 15:00	28-01-22	29-01-22	29-01-22	24-01-22	10-02-22 15:00
		Sample Type	Rinsate	Field_B	Rinsate	Field_B	Rinsate	Field_B	Rinsate	Field_B	Field_B	Rinsate	Field_B	Rinsate	Trip_B	Trip_B
ChemName	**Units**	**EQL**														
BTEX																
Benzene	µg/L	1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1	<1		
Toluene	µg/L	2	<2	<2		<2	<2	<2	<2	<2	<2	<2	<2	<2		
Ethylbenzene	µg/L	2	<2	<2		<2	<2	<2	<2	<2	<2	<2	<2	<2		
Xylene (m & p)	µg/L	2	<2	<2		<2	<2	<2	<2	<2	<2	<2	<2	<2		
Xylene (o)	µg/L	2	<2	<2		<2	<2	<2	<2	<2	<2	<2	<2	<2		
Xylene Total	µg/L	2	<2	<2		<2	<2	<2	<2	<2	<2	<2	<2	<2		
Total BTEX	µg/L	1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1	<1		
Metals																
Arsenic	mg/l	0.001	<0.001		<0.001		<0.001		<0.001			<0.001		<0.001		
Cadmium	mg/l	0.0001	<0.0001		<0.0001		<0.0001		<0.0001			<0.0001		<0.0001		
Chromium (III+VI)	mg/l	0.001	<0.001		<0.001		<0.001		<0.001			<0.001		<0.001		
Copper	mg/l	0.001	<0.001		<0.001		<0.001		<0.001			<0.001		<0.001		
Lead	mg/l	0.001	<0.001		<0.001		<0.001		<0.001			<0.001		<0.001		
Mercury	mg/l	0.00004	<0.0001		<0.0001		<0.0001		<0.0001			<0.0001		<0.0001		
Nickel	mg/l	0.001	<0.001		<0.001		<0.001		<0.001			<0.001		<0.001		
Zinc	mg/l	0.005	<0.005		<0.005		<0.005		<0.005			<0.005		<0.005		
OCP																
4,4-DDE	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
a-BHC	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Aldrin	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Aldrin + Dieldrin	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
b-BHC	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
chlordane	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
d-BHC	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
DDD	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
DDT	µg/L	2	<2				<2		<2			<2		<2		
Dieldrin	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Endosulfan I	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Endosulfan II	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Endosulfan sulphate	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Endrin	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Endrin aldehyde	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Endrin ketone	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
g-BHC (Lindane)	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Heptachlor	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
DDT+DDE+DDD	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Heptachlor epoxide	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Hexachlorobenzene	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Methoxychlor	µg/L	2	<2				<2		<2			<2		<2		
Organochlorine Pesticides																
Chlordane (cis)	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Chlordane (trans)	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Organophosphorous Pesticides																
Azinophos methyl	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Bromophos-ethyl	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Carbophenothion	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Chlorfenvinphos	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Chlorpyrifos	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Chlorpyrifos-methyl	mg/l	0.0005	<0.0005				<0.0005		<0.0005			<0.0005		<0.0005		
Diazinon	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Dichlorvos	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Dimethoate	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Ethion	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Fenthion	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Malathion	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Methyl parathion	µg/L	2	<2				<2		<2			<2		<2		
Monocrotophos	µg/L	2	<2				<2		<2			<2		<2		
Prothiofos	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Other																
Acidity (as CaCO3)	mg/l	1														
Diethanolamine	mg/l	0.001	<0.001		<0.001		<0.001		<0.001			<0.001		<0.01		
Ethanolamine	mg/l	0.001	<0.001		<0.001		<0.001		<0.001			<0.001		<0.01		
Methyldiethanolamine	mg/l	0.001	<0.001		<0.001		<0.001		<0.001			<0.001		<0.01		
PAH																
Acenaphthene	µg/L	1	<1				<1		<1			<1		<1		
Acenaphthylene	µg/L	1	<1				<1		<1			<1		<1		
Anthracene	µg/L	1	<1				<1		<1			<1		<1		
Benz(a)anthracene	µg/L	1	<1				<1		<1			<1		<1		
Benzo(a) pyrene	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
Benzo(g,h,i)perylene	µg/L	1	<1				<1		<1			<1		<1		
Benzo(k)fluoranthene	µg/L	1	<1				<1		<1			<1		<1		
Chrysene	µg/L	1	<1				<1		<1			<1		<1		
Benzo(b+j)fluoranthene	mg/l	0.001	<0.001				<0.001		<0.001			<0.001		<0.001		
Dibenz(a,h)anthracene	µg/L	1	<1				<1		<1			<1		<1		
Fluoranthene	µg/L	1	<1				<1		<1			<1		<1		
Fluorene	µg/L	1	<1				<1		<1			<1		<1		
Indeno(1,2,3-c,d)pyrene	µg/L	1	<1				<1		<1			<1		<1		
Phenanthrene	µg/L	1	<1				<1		<1			<1		<1		
Pyrene	µg/L	1	<1				<1		<1			<1		<1		
PAHs (Sum of total)	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		

Table 3
QAQC - Field Blanks, Rinsate and Trip Blanks
Perdaman Urea Project
754-PEREN295751

		Lab Report Number	EP2200878	EP2200878	EP2201003	EP2201003	EP2201008	EP2201008	EP2201086	EP2201086	EP2201074	EP2201074	EP2201196	EP2201196	EP2200878	EP2201691
		Field ID	QC1	QC2	QC11	QC12	QC17	QC18	QC19	QC20	QC30	QC31	QC38	QC39	TBW44	TBW46
		Sampled Date/Time	24-01-22 12:30	24-01-22	25-01-22	25-01-22	26-01-22	26-01-22	27-01-22	27-01-22	28-01-22 15:00	28-01-22	29-01-22	29-01-22	24-01-22	10-02-22 15:00
		Sample Type	Rinsate	Field_B	Rinsate	Field_B	Rinsate	Field_B	Rinsate	Field_B	Field_B	Rinsate	Field_B	Rinsate	Trip_B	Trip_B
PCBs																
PCBs (Sum of total)	µg/L	1	<1				<1		<1			<1		<1		
(n:2) Fluorotelomer Sulfonic Acids																
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	<0.05		<0.05		<0.05		<0.05			<0.05		<0.05	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	<0.05		<0.05		<0.05		<0.05			<0.05		<0.05	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	<0.05		<0.05		<0.05		<0.05			<0.05		<0.05	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	<0.05		<0.05		<0.05		<0.05			<0.05		<0.05	<0.001	<0.001
Perfluoroalkane Carboxylic Acids																
Perfluorobutanoic acid (PFBA)	µg/L	0.002	<0.1		<0.1		<0.1		<0.1			<0.1		<0.1	<0.002	<0.002
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	<0.02		<0.02		<0.02		<0.02			<0.02		<0.02	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	<0.02		<0.02		<0.02		<0.02			<0.02		<0.02	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	<0.02		<0.02		<0.02		<0.02			<0.02		<0.02	<0.0005	<0.0005
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	<0.01		<0.01		<0.01		<0.01			<0.01		<0.01	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005	<0.02		<0.02		<0.02		<0.02			<0.02		<0.02	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	<0.02		<0.02		<0.02		<0.02			<0.02		<0.02	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	<0.02		<0.02		<0.02		<0.02			<0.02		<0.02	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	<0.02		<0.02		<0.02		<0.02			<0.02		<0.02	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	<0.02		<0.02		<0.02		<0.02			<0.02		<0.02	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	<0.05		<0.05		<0.05		<0.05			<0.05		<0.05	<0.0005	<0.0005
Perfluoroalkane Sulfonic Acids																
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	<0.02		<0.02		<0.02		<0.02			<0.02		<0.02	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	<0.02		<0.02		<0.02		<0.02			<0.02		<0.02	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	<0.01		<0.01		<0.01		<0.01			<0.01		<0.01	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	<0.02		<0.02		<0.02		<0.02			<0.02		<0.02	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	<0.01		<0.01		<0.01		<0.01			<0.01		<0.01	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	<0.02		<0.02		<0.02		<0.02			<0.02		<0.02	<0.0005	<0.0005
Perfluoroalkyl Sulfonamides																
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	<0.02		<0.02		<0.02		<0.02			<0.02		<0.02	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	<0.05		<0.05		<0.05		<0.05			<0.05		<0.05	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	<0.05		<0.05		<0.05		<0.05			<0.05		<0.05	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	<0.02		<0.02		<0.02		<0.02			<0.02		<0.02	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	<0.02		<0.02		<0.02		<0.02			<0.02		<0.02	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	<0.05		<0.05		<0.05		<0.05			<0.05		<0.05	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	<0.05		<0.05		<0.05		<0.05			<0.05		<0.05	<0.001	<0.001
Pesticides																
Demeton-S-methyl	µg/L	0.5	<0.5		<0.01		<0.5		<0.5			<0.5		<0.5		
Fenamiphos	µg/L	0.5	<0.5		<0.01		<0.5		<0.5			<0.5		<0.5		
Parathion	µg/L	2	<2		<0.01		<2		<2			<2		<2		
Pirimphos-ethyl	µg/L	0.5	<0.5				<0.5		<0.5			<0.5		<0.5		
PFAS																
Sum of PFHxS and PFOS	µg/L	0.0002	<0.01				<0.01		<0.01			<0.01		<0.01	<0.0002	<0.0002
Sum of PFAS (WA DER List)	µg/L	0.0002	<0.01				<0.01		<0.01			<0.01		<0.01	<0.0002	<0.0002
Sum of PFAS	µg/L	0.0002	<0.01				<0.01		<0.01			<0.01		<0.01	<0.0002	<0.0002
Polycyclic Aromatic Hydrocarbons																
Naphthalene	µg/L	1	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5		
Benzo(a)pyrene TEQ calc (Zero)	mg/l	0.0005	<0.0005				<0.0005		<0.0005			<0.0005		<0.0005		
Total Recoverable Hydrocarbons																
C10 - C40 (Sum of total)	mg/l	0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
TPH																
F1 (C6-C10) less BTEX	mg/l	0.02	<0.02	<0.02		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		
F2 C10-C16 (minus Naphthalene)	mg/l	0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
C6 - C9	mg/l	0.02	<0.02	<0.02		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		
C10 - C14	mg/l	0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
C15 - C28	mg/l	0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
C29-C36	mg/l	0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
+C10 - C36 (Sum of total)	mg/l	0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
F1 (C6-C10)	mg/l	0.02	<0.02	<0.02		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		
F2 (C10-C16 Hydrocarbons)	mg/l	0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
F3 (C16-C34 Hydrocarbons)	mg/l	0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
C34-C40	mg/l	0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		

Table 4a
QAQC - Soil RPD%
Perdaman Urea Project
754-PEREN295751

Lab Report Number	EP2201003	EP2201003		EP2201008	EP2201008		EP2201008	Interlab D		EP2201074	EP2201074		EP2201074	Interlab D		EP2201074	EP2201074		EP2201074	Interlab D	
Field ID	SS22 1.0m	QC3	**RPD**	SS14 1.0m	QC13	**RPD**	SS14 1.0m	QC14	**RPD**	SS11 0	QC21	**RPD**	SS11 0	QC22	**RPD**	SS11 0.5	QC23	**RPD**	SS11 0.5	QC24	**RPD**
Sampled Date/Time	25-01-22 15:00	25-01-22 15:00		26-01-22	26-01-22		26-01-22	26-01-22		28-01-22 15:00	28-01-22 15:00		28-01-22 15:00	28-01-22 15:00		28-01-22	28-01-22		28-01-22 15:00	28-01-22 15:00	
ChemName	**Units**	**LOR**																			
OCP																					
4,4-DDE	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
a-BHC	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
Aldrin	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
Aldrin + Dieldrin	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
b-BHC	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
chlordane	mg/kg	0.05 : 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.1	0										
d-BHC	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
DDD	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
DDT	mg/kg	0.2 : 0.05 (Interlab)				<0.2	<0.2	0	<0.2	<0.05	0										
Dieldrin	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
Endosulfan I	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
Endosulfan II	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
Endosulfan sulphate	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
Endrin	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
Endrin aldehyde	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
Endrin ketone	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
g-BHC (Lindane)	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
Heotachlor	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
DDT+DDE+DDD	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
Heptachlor epoxide	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
Hexachlorobenzene	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0										
Methoxychlor	mg/kg	0.2 : 0.05 (Interlab)				<0.2	<0.2	0	<0.2	<0.05	0										
PAH																					
Acenaphthene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Acenaphthylene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Anthracene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Benz(a)anthracene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Benzo(a) pyrene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Benzo(a)pyrene TEQ calc (Half)	mg/kg	0.5				0.6	0.6	0	0.6	0.6	0	0.6	0.6	0	0.6	0.6	0	0.6	0.6	0	0.6	0.6	0
Benzo(g,h,i)perylene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Benzo(k)fluoranthene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Chrysene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Benzo(b+j)fluoranthene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Dibenz(a,h)anthracene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Fluoranthene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Fluorene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Phenanthrene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Pyrene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
PAHs (Sum of total)	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Metals																					
Arsenic	mg/kg	5 : 2 (Interlab)	**<5**	**11**	**75**	**<5**	**14**	**95**	**<5**	**13**	**89**	**7**	**10**	**35**	7	6.4	9	8	10	22	8	8.3	4
Cadmium	mg/kg	1 : 0.4 (Interlab)	<1	<1	0	<1	<1	0	<1	<0.4	0	<1	<1	0	<1	<0.4	0	<1	<1	0	<1	<0.4	0
Chromium (III+VI)	mg/kg	2 : 5 (Interlab)	18	23	24	**16**	**29**	**58**	**16**	**30**	**61**	30	32	6	30	26	14	**34**	**53**	**44**	**34**	**56**	**49**
Copper	mg/kg	5	8	6	29	<5	5	0	<5	5	0	13	13	0	**13**	**8.8**	**39**	**14**	**20**	**35**	14	17	19
Lead	mg/kg	5	<5	<5	0	<5	<5	0	<5	<5	0	6	7	15	6	6.2	3	6	8	29	**6**	**10**	**50**
Mercury	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
Nickel	mg/kg	2 : 5 (Interlab)	14	11	24	9	12	29	**9**	**14**	**43**	17	16	6	17	13	27	**20**	**30**	**40**	20	26	26
Zinc	mg/kg	5	**35**	**19**	**59**	**44**	**10**	**126**	**44**	**13**	**109**	22	25	13	22	21	5	27	23	16	27	21	25
Perfluoroalkane Sulfonic Acids																					
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluoroalkane Carboxylic Acids																					
Perfluorobutanoic acid (PFBA)	mg/kg	0.001 : 0.0005 (Interlab)	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.0005	0	<0.001	<0.001	0	<0.001	<0.0005	0	<0.001	<0.001	0	<0.001	<0.0005	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005 : 0.0001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0001	0	<0.0005	<0.0005	0	<0.0005	<0.0001	0	<0.0005	<0.0005	0	<0.0005	<0.0001	0
(n:2) Fluorotelomer Sulfonic Acids																					
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005 : 0.0001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0001	0	<0.0005	<0.0005	0	<0.0005	<0.0001	0	<0.0005	<0.0005	0	<0.0005	<0.0001	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005 : 0.0001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0001	0	<0.0005	<0.0005	0	<0.0005	<0.0001	0	<0.0005	<0.0005	0	<0.0005	<0.0001	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005 : 0.0001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0001	0	<0.0005	<0.0005	0	<0.0005	<0.0001	0	<0.0005	<0.0005	0	<0.0005	<0.0001	0
Perfluoroalkyl Sulfonamides																					
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002 : 0.0005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0005	0	<0.0002	<0.0002	0	<0.0002	<0.0005	0	<0.0002	<0.0002	0	<0.0002	<0.0005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002 : 0.0005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0005	0	<0.0002	<0.0002	0	<0.0002	<0.0005	0	<0.0002	<0.0002	0	<0.0002	<0.0005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002 : 0.0005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0005	0	<0.0002	<0.0002	0	<0.0002	<0.0005	0	<0.0002	<0.0002	0	<0.0002	<0.0005	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0
PFAS																					
Sum of PFHxS and PFOS	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Sum of PFAS	mg/kg	0.0002 : 0.0005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0005	0	<0.0002	<0.0002	0	<0.0002	<0.0005	0	<0.0002	<0.0002	0	<0.0002	<0.0005	0
BTEX																					
Benzene	mg/kg	0.2 : 0.1 (Interlab)				<0.2	<0.2	0	<0.2	<0.1	0	<0.2	<0.2	0	<0.2	<0.1	0	<0.2	<0.2	0	<0.2	<0.1	0
Toluene	mg/kg	0.5 : 0.1 (Interlab)				<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0
Ethylbenzene	mg/kg	0.5 : 0.1 (Interlab)				<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0
Xylene (m & p)	mg/kg	0.5 : 0.2 (Interlab)				<0.5	<0.5	0	<0.5	<0.2	0	<0.5	<0.5	0	<0.5	<0.2	0	<0.5	<0.5	0	<0.5	<0.2	0
Xylene (o)	mg/kg	0.5 : 0.1 (Interlab)				<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0
Xylene Total	mg/kg	0.5 : 0.3 (Interlab)				<0.5	<0.5	0	<0.5	<0.3	0	<0.5	<0.5	0	<0.5	<0.3	0	<0.5	<0.5	0	<0.5	<0.3	0
Total BTEX	mg/kg	0.2				<0.2	<0.2	0				<0.2	<0.2	0	<0.2			<0.2	<0.2	0			

Table 4a
QAQC - Soil RPD%
Perdaman Urea Project
754-PEREN295751

TETRA TECH COFFEY

		Lab Report Number	EP2201003	EP2201003		EP2201008	EP2201008		EP2201008	Interlab D		EP2201074	EP2201074		EP2201074	Interlab D		EP2201074	EP2201074		EP2201074	Interlab D	
		Field ID	SS22 1.0m	QC3	**RPD**	SS14 1.0m	QC13	**RPD**	SS14 1.0m	QC14	**RPD**	SS11 0	QC21	**RPD**	SS11 0	QC22	**RPD**	SS11 0.5	QC23	**RPD**	SS11 0.5	QC24	**RPD**
		Sampled Date/Time	25-01-22 15:00	25-01-22 15:00		26-01-22	26-01-22		26-01-22	26-01-22		28-01-22 15:00	28-01-22 15:00		28-01-22 15:00	28-01-22 15:00		28-01-22	28-01-22		28-01-22 15:00	28-01-22 15:00	
Total Recoverable Hydrocarbons																							
C10 - C40 (Sum of total)	mg/kg	50 : 100 (Interlab)				<50	<50	0	<50	<100	0	<50	<50	0	<50	<100	0	<50	<50	0	<50	<100	0
Polycyclic Aromatic Hydrocarbons																							
Naphthalene	mg/kg	1 : 0.5 (Interlab)				<1	<1	0	<1	<0.5	0	<1	<1	0	<1	<0.5	0	<1	<1	0	<1	<0.5	0
Naphthalene	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5				1.2	1.2	0	1.2	1.2	0	1.2	1.2	0	1.2	1.2	0	1.2	1.2	0	1.2	1.2	0
Benzo(a)pyrene TEQ calc (Zero)	mg/kg	0.5				<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Organochlorine Pesticides																							
Chlordane (cis)	mg/kg	0.05				<0.05	<0.05	0															
Chlordane (trans)	mg/kg	0.05				<0.05	<0.05	0															
Endosulfan	mg/kg	0.05				<0.05	<0.05	0															
Organophosphorous Pesticides																							
Azinophos methyl	mg/kg	0.05 : 0.2 (Interlab)				<0.05	<0.05	0	<0.05	<0.2	0												
Bromophos-ethyl	mg/kg	0.05				<0.05	<0.05	0															
Carbophenothion	mg/kg	0.05				<0.05	<0.05	0															
Chlorfenvinphos	mg/kg	0.05 : 0.2 (Interlab)				<0.05	<0.05	0	<0.05	<0.2	0												
Chlorpyrifos	mg/kg	0.05 : 0.2 (Interlab)				<0.05	<0.05	0	<0.05	<0.2	0												
Chlorpyrifos-methyl	mg/kg	0.05 : 0.2 (Interlab)				<0.05	<0.05	0	<0.05	<0.2	0												
Diazinon	mg/kg	0.05 : 0.2 (Interlab)				<0.05	<0.05	0	<0.05	<0.2	0												
Dichlorvos	mg/kg	0.05 : 0.2 (Interlab)				<0.05	<0.05	0	<0.05	<0.2	0												
Dimethoate	mg/kg	0.05 : 0.2 (Interlab)				<0.05	<0.05	0	<0.05	<0.2	0												
Ethion	mg/kg	0.05 : 0.2 (Interlab)				<0.05	<0.05	0	<0.05	<0.2	0												
Fenthion	mg/kg	0.05 : 0.2 (Interlab)				<0.05	<0.05	0	<0.05	<0.2	0												
Malathion	mg/kg	0.05 : 0.2 (Interlab)				<0.05	<0.05	0	<0.05	<0.2	0												
Methyl parathion	mg/kg	0.2				<0.2	<0.2	0	<0.2	<0.2	0												
Monocrotophos	mg/kg	0.2 : 2 (Interlab)				<0.2	<0.2	0	<0.2	<2	0												
Prothiofos	mg/kg	0.05				<0.05	<0.05	0															
Other																							
Diethanolamine	mg/kg	10 : 5 (Interlab)				<10	<10	0	<10	<5	0	<10	<10	0	<10	<5	0	<10	<10	0	<10	<5	0
Ethanolamine	mg/kg	10 : 5 (Interlab)				<10	<10	0	<10	<5	0	<10	<10	0	<10	<5	0	<10	<10	0	<10	<5	0
Methyldiethanolamine	mg/kg	10 : 0.05 (Interlab)				<10	<10	0	<10	<0.05	0	<10	<10	0	<10	<0.05	0	<10	<10	0	<10	<0.05	0
PCBs																							
PCBs (Sum of total)	mg/kg	0.1				<0.1	<0.1	0	<0.1	<0.1	0												
Pesticides																							
Demeton-S-methyl	mg/kg	0.05				<0.05	<0.05	0															
Fenamiphos	mg/kg	0.05				<0.05	<0.05	0															
Parathion	mg/kg	0.2				<0.2	<0.2	0	<0.2	<0.2	0												
Pirimphos-ethyl	mg/kg	0.05				<0.05	<0.05	0															
TPH																							
F1 (C6-C10) less BTEX	mg/kg	10 : 20 (Interlab)				<10	<10	0	<10	<20	0	<10	<10	0	<10	<20	0	<10	<10	0	<10	<20	0
F2 C10-C16 (minus Naphthalene)	mg/kg	50				<50	<50	0	<50	<50	0	<50	<50	0	<50	<50	0	<50	<50	0	<50	<50	0
C6 - C9	mg/kg	10 : 20 (Interlab)				<10	<10	0	<10	<20	0	<10	<10	0	<10	<20	0	<10	<10	0	<10	<20	0
C10 - C14	mg/kg	50 : 20 (Interlab)				<50	<50	0	<50	<20	0	<50	<50	0	<50	<20	0	<50	<50	0	<50	<20	0
C15 - C28	mg/kg	100 : 50 (Interlab)				<100	<100	0	<100	<50	0	<100	<100	0	<100	<50	0	<100	<100	0	<100	<50	0
C29-C36	mg/kg	100 : 50 (Interlab)				<100	<100	0	<100	<50	0	<100	<100	0	<100	<50	0	<100	<100	0	<100	<50	0
+C10 - C36 (Sum of total)	mg/kg	50				<50	<50	0	<50	<50	0	<50	<50	0	<50	<50	0	<50	<50	0	<50	<50	0
F1 (C6-C10)	mg/kg	10 : 20 (Interlab)				<10	<10	0	<10	<20	0	<10	<10	0	<10	<20	0	<10	<10	0	<10	<20	0
F2 (C10-C16 Hydrocarbons)	mg/kg	50				<50	<50	0	<50	<50	0	<50	<50	0	<50	<50	0	<50	<50	0	<50	<50	0
F3 (C16-C34 Hydrocarbons)	mg/kg	100				<100	<100	0	<100	<100	0	<100	<100	0	<100	<100	0	<100	<100	0	<100	<100	0
C34-C40	mg/kg	100				<100	<100	0	<100	<100	0	<100	<100	0	<100	<100	0	<100	<100	0	<100	<100	0

Table 4a
QAQC - Soil RPD%
Perdaman Urea Project
754-PEREN295751

		Lab Report Number	EP2201074	EP2201074		EP2201074	Interlab D		EP2201196	EP2201196		EP2201196	Interlab D		EP2201196	EP2201196		EP2201196	Interlab D	
		Field ID	SS9 1.0	QC25	**RPD**	SS9 1.0	QC26	**RPD**	SS7 0.5	QC32	**RPD**	SS7 0.5	QC33	**RPD**	SS2 1.0	QC34	**RPD**	SS2 1.0	QC35	**RPD**
		Sampled Date/Time	28-01-22 15:00	28-01-22 15:00		28-01-22 15:00	28-01-22 15:00		29-01-22 8:43	29-01-22 8:43		29-01-22 8:43	29-01-22 8:43		29-01-22 8:43	29-01-22 8:43		29-01-22 8:43	29-01-22 8:43	
ChemName	**Units**	**LOR**																		
OCP																				
4,4-DDE	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
a-BHC	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
Aldrin	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
Aldrin + Dieldrin	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
b-BHC	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
chlordane	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.1	0
d-BHC	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
DDD	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
DDT	mg/kg	0.2 : 0.05 (Interlab)	<0.2	<0.2	0	<0.2									<0.2	<0.2	0	<0.2	<0.05	0
Dieldrin	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
Endosulfan I	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
Endosulfan II	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
Endosulfan sulphate	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
Endrin	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
Endrin aldehyde	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
Endrin ketone	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
g-BHC (Lindane)	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
Heptachlor	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
DDT+DDE+DDD	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
Heptachlor epoxide	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
Hexachlorobenzene	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.05	0
Methoxychlor	mg/kg	0.2 : 0.05 (Interlab)	<0.2	<0.2	0	<0.2									<0.2	<0.2	0	<0.2	<0.05	0
PAH																				
Acenaphthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Acenaphthylene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Anthracene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Benz(a)anthracene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Benzo(a) pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Benzo(a)pyrene TEQ calc (Half)	mg/kg	0.5	0.6	0.6	0	0.6	0.6	0							0.6	0.6	0	0.6	0.6	0
Benzo(g,h,i)perylene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Benzo(k)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Chrysene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Benzo(b+j)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Dibenz(a,h)anthracene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Fluorene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Phenanthrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
PAHs (Sum of total)	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Metals																				
Arsenic	mg/kg	5 : 2 (Interlab)	<5	<5	0	<5	3.4	0	<5	<5	0	<5	4.7	0	<5	<5	0	<5	4.9	0
Cadmium	mg/kg	1 : 0.4 (Interlab)	<1	<1	0	<1	<0.4	0	<1	<1	0	<1	<0.4	0	<1	<1	0	<1	<0.4	0
Chromium (III+VI)	mg/kg	2 : 5 (Interlab)	**57**	**39**	**38**	57	65	13	37	35	6	37	34	8	37	39	5	37	45	20
Copper	mg/kg	5	16	16	0	16	12	29	13	14	7	13	11	17	20	16	22	**20**	**13**	**42**
Lead	mg/kg	5	6	6	0	6	6.2	3	8	7	13	8	9.2	14	6	6	0	**6**	**8.3**	**32**
Mercury	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
Nickel	mg/kg	2 : 5 (Interlab)	**34**	**21**	**47**	**34**	**21**	**47**	22	19	15	22	18	20	23	18	24	23	20	14
Zinc	mg/kg	5	**35**	**22**	**46**	35	32	9	26	26	0	26	28	7	19	20	5	19	22	15
Perfluoroalkane Sulfonic Acids																				
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluoroalkane Carboxylic Acids																				
Perfluorobutanoic acid (PFBA)	mg/kg	0.001 : 0.0005 (Interlab)	<0.001	<0.001	0	<0.001	<0.0005	0							<0.001	<0.001	0	<0.001	<0.0005	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005 : 0.0001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0001	0							<0.0005	<0.0005	0	<0.0005	<0.0001	0
(n:2) Fluorotelomer Sulfonic Acids																				
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005 : 0.0001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0001	0							<0.0005	<0.0005	0	<0.0005	<0.0001	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0							<0.0005	<0.0005	0	<0.0005	<0.0005	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005 : 0.0001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0001	0							<0.0005	<0.0005	0	<0.0005	<0.0001	0
10:2 Fluorotelomer sulfonic acid (10.2 FTS)	mg/kg	0.0005 : 0.0001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0001	0							<0.0005	<0.0005	0	<0.0005	<0.0001	0
Perfluoroalkyl Sulfonamides																				
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002 : 0.0005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0005	0							<0.0002	<0.0002	0	<0.0002	<0.0005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0							<0.0005	<0.0005	0	<0.0005	<0.0005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0							<0.0005	<0.0005	0	<0.0005	<0.0005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002 : 0.0005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0005	0							<0.0002	<0.0002	0	<0.0002	<0.0005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002 : 0.0005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0005	0							<0.0002	<0.0002	0	<0.0002	<0.0005	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0							<0.0005	<0.0005	0	<0.0005	<0.0005	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0							<0.0005	<0.0005	0	<0.0005	<0.0005	0
PFAS																				
Sum of PFHxS and PFOS	mg/kg	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0							<0.0002	<0.0002	0	<0.0002	<0.0001	0
Sum of PFAS	mg/kg	0.0002 : 0.0005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0005	0							<0.0002	<0.0002	0	<0.0002	<0.0005	0
BTEX																				
Benzene	mg/kg	0.2 : 0.1 (Interlab)	<0.2	<0.2	0	<0.2	<0.1	0							<0.2	<0.2	0	<0.2	<0.1	0
Toluene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0							<0.5	<0.5	0	<0.5	<0.1	0
Ethylbenzene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0							<0.5	<0.5	0	<0.5	<0.1	0
Xylene (m & p)	mg/kg	0.5 : 0.2 (Interlab)	<0.5	<0.5	0	<0.5	<0.2	0							<0.5	<0.5	0	<0.5	<0.2	0
Xylene (o)	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0							<0.5	<0.5	0	<0.5	<0.1	0
Xylene Total	mg/kg	0.5 : 0.3 (Interlab)	<0.5	<0.5	0	<0.5	<0.3	0							<0.5	<0.5	0	<0.5	<0.3	0
Total BTEX	mg/kg	0.2	<0.2	<0.2	0	<0.2									<0.2	<0.2	0	<0.2		

Table 4a
QAQC - Soil RPD%
Perdaman Urea Project
754-PEREN295751

		Lab Report Number	EP2201074	EP2201074		EP2201074	Interlab D		EP2201196	EP2201196		EP2201196	Interlab D		EP2201196	EP2201196		EP2201196	Interlab D	
		Field ID	SS9 1.0	QC25	**RPD**	SS9 1.0	QC26	**RPD**	SS7 0.5	QC32	**RPD**	SS7 0.5	QC33	**RPD**	SS2 1.0	QC34	**RPD**	SS2 1.0	QC35	**RPD**
		Sampled Date/Time	28-01-22 15:00	28-01-22 15:00		28-01-22 15:00	28-01-22 15:00		29-01-22 8:43	29-01-22 8:43		29-01-22 8:43	29-01-22 8:43		29-01-22 8:43	29-01-22 8:43		29-01-22 8:43	29-01-22 8:43	
Total Recoverable Hydrocarbons																				
C10 - C40 (Sum of total)	mg/kg	50 : 100 (Interlab)	<50	<50	0	<50	<100	0							<50	<50	0	<50	<100	0
Polycyclic Aromatic Hydrocarbons																				
Naphthalene	mg/kg	1 : 0.5 (Interlab)	<1	<1	0	<1	<0.5	0							<1	<1	0	<1	<0.5	0
Naphthalene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5	1.2	1.2	0	1.2	1.2	0							1.2	1.2	0	1.2	1.2	0
Benzo(a)pyrene TEQ calc (Zero)	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0							<0.5	<0.5	0	<0.5	<0.5	0
Organochlorine Pesticides																				
Chlordane (cis)	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05		
Chlordane (trans)	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05		
Endosulfan	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05		
Organophosphorous Pesticides																				
Azinophos methyl	mg/kg	0.05 : 0.2 (Interlab)	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.2	0
Bromophos-ethyl	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05		
Carbophenothion	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05		
Chlorfenvinphos	mg/kg	0.05 : 0.2 (Interlab)	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.2	0
Chlorpyrifos	mg/kg	0.05 : 0.2 (Interlab)	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.2	0
Chlorpyrifos-methyl	mg/kg	0.05 : 0.2 (Interlab)	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.2	0
Diazinon	mg/kg	0.05 : 0.2 (Interlab)	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.2	0
Dichlorvos	mg/kg	0.05 : 0.2 (Interlab)	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.2	0
Dimethoate	mg/kg	0.05 : 0.2 (Interlab)	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.2	0
Ethion	mg/kg	0.05 : 0.2 (Interlab)	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.2	0
Fenthion	mg/kg	0.05 : 0.2 (Interlab)	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.2	0
Malathion	mg/kg	0.05 : 0.2 (Interlab)	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05	<0.2	0
Methyl parathion	mg/kg	0.2	<0.2	<0.2	0	<0.2									<0.2	<0.2	0	<0.2	<0.2	0
Monocrotophos	mg/kg	0.2 : 2 (Interlab)	<0.2	<0.2	0	<0.2									<0.2	<0.2	0	<0.2	<2	0
Prothiofos	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05		
Other																				
Diethanolamine	mg/kg	10 : 5 (Interlab)																		
Ethanolamine	mg/kg	10 : 5 (Interlab)																		
Methyldiethanolamine	mg/kg	10 : 0.05 (Interlab)																		
PCBs																				
PCBs (Sum of total)	mg/kg	0.1	<0.1	<0.1	0	<0.1									<0.1	<0.1	0	<0.1	<0.1	0
Pesticides																				
Demeton-S-methyl	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05		
Fenamiphos	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05		
Parathion	mg/kg	0.2	<0.2	<0.2	0	<0.2									<0.2	<0.2	0	<0.2	<0.2	0
Pirimphos-ethyl	mg/kg	0.05	<0.05	<0.05	0	<0.05									<0.05	<0.05	0	<0.05		
TPH																				
F1 (C6-C10) less BTEX	mg/kg	10 : 20 (Interlab)	<10	<10	0	<10	<20	0							<10	<10	0	<10	<20	0
F2 C10-C16 (minus Naphthalene)	mg/kg	50	<50	<50	0	<50	<50	0							<50	<50	0	<50	<50	0
C6 - C9	mg/kg	10 : 20 (Interlab)	<10	<10	0	<10	<20	0							<10	<10	0	<10	<20	0
C10 - C14	mg/kg	50 : 20 (Interlab)	<50	<50	0	<50	<20	0							<50	<50	0	<50	<20	0
C15 - C28	mg/kg	100 : 50 (Interlab)	<100	<100	0	<100	<50	0							<100	<100	0	<100	<50	0
C29-C36	mg/kg	100 : 50 (Interlab)	<100	<100	0	<100	<50	0							<100	<100	0	<100	<50	0
+C10 - C36 (Sum of total)	mg/kg	50	<50	<50	0	<50	<50	0							<50	<50	0	<50	<50	0
F1 (C6-C10)	mg/kg	10 : 20 (Interlab)	<10	<10	0	<10	<20	0							<10	<10	0	<10	<20	0
F2 (C10-C16 Hydrocarbons)	mg/kg	50	<50	<50	0	<50	<50	0							<50	<50	0	<50	<50	0
F3 (C16-C34 Hydrocarbons)	mg/kg	100	<100	<100	0	<100	<100	0							<100	<100	0	<100	<100	0
C34-C40	mg/kg	100	<100	<100	0	<100	<100	0							<100	<100	0	<100	<100	0

Table 4b
QAQC - Water RPD%
Perdaman Urea Project
754-PEREN295751

		Lab Report Number	EP2201196	EP2201196		EP2201196	Interlab D		EP2201691	EP2201691		EP2201691	Interlab D		EP2201691	EP2201691		EP2201691	Interlab D	
		Field ID	SW5	QC36	**RPD**	SW5	QC37	**RPD**	MW010	QC01	**RPD**	MW010	QC02	**RPD**	MW08	QC06	**RPD**	MW08	QC07	**RPD**
		Sampled Date/Time	29-01-22	29-01-22		29-01-22	29-01-22		09-02-22 15:00	09-02-22 15:00		09-02-22 15:00	09-02-22 15:00		09-02-22 15:00	09-02-22 15:00		09-02-22 15:00	09-02-22 15:00	
ChemName	**Units**	**LOR**																		
Physical Parameters																				
Electrical Conductivity @ 25C (lab)	µS/cm	1 : 10 (Interlab)							8930	9010	1	**8930**	**140000**	**176**	162000	145000	11	**162000**	**8800**	**179**
Total Dissolved Solids (TDS)	mg/l	10							5160	5010	3	**5160**	**130000**	**185**	139000	130000	7	**139000**	**4700**	**187**
pH (lab)	pH_unit	0.01 : 0.1 (Interlab)							8.31	8.36	1	8.31	7.5	10	7.5	7.52	0	7.5	8.3	10
Alkalinity																				
Alkalinity (total as CaCO3)	mg/l	1 : 20 (Interlab)							344	348	1	**344**	**130**	**90**	131	120	9	**131**	**370**	**95**
Alkalinity (Hydroxide) as CaCO3	mg/l	1							<1	<1	0	<1			<1	<1	0	<1		
Carbonate Alkalinity as CaCO3	mg/l	1							**<1**	**8**	**156**	<1			<1	<1	0	<1		
Ions																				
Calcium (Filtered)	mg/l	1							30	29	3	30			1500	1460	3	1500		
Chloride	mg/l	1							2590	2570	1	**2590**	**61000**	**184**	70700	68800	3	**70700**	**2600**	**186**
Potassium (Filtered)	mg/l	1							94	94	0	94			1540	1460	5	1540		
Sodium (Filtered)	mg/l	1							1690	1700	1	1690			42500	39800	7	42500		
Ionic Balance	%	0.01							**1.4**	**0.81**	**53**	1.4			**4.4**	**2.54**	**54**	4.4		
Anions Total	meq/L	0.01							87	86.5	1	87			2160	2100	3	2160		
Cations Total	meq/L	0.01							84.6	85.1	1	84.6			2360	2210	7	2360		
Nutrients																				
Ammonia as N	mg/l	0.01	0.1	0.08	22	0.1	0.1	0	**<0.01**	**0.09**	**160**	**<0.01**	**1.3**	**197**	0.74	0.55	29	**0.74**	**<0.01**	**195**
Nitrite + Nitrate as N	mg/l	0.01 : 0.05 (Interlab)	<0.01	<0.01	0	<0.01	<0.05	0	9.17	9.17	0	**9.17**	**6.1**	**40**	5.54	6.22	12	**5.54**	**8.9**	**47**
Nitrate (as NO3-N)	mg/l	0.01 : 0.02 (Interlab)	<0.01	<0.01	0	<0.01	<0.05	0	9.16	9.17	0	**9.16**	**6.1**	**40**	5.48	6.2	12	**5.48**	**8.9**	**48**
Nitrite (as NO2-N)	mg/l	0.01 : 0.02 (Interlab)	<0.01	<0.01	0	<0.01	<0.02	0	0.01	<0.01	0	0.01	<0.02	0	**0.06**	**0.02**	**100**	**0.06**	**<0.02**	**100**
Nitrogen (Total)	mg/l	0.1 : 0.2 (Interlab)	1	1	0	**1**	**0.4**	**86**	9.8	9.8	0	9.8			9.5	8.2	15	9.5		
Total Kjeldahl Nitrogen (TKN)	mg/l	0.1 : 0.2 (Interlab)	1	1	0	**1**	**0.4**	**86**	0.6	0.6	0	0.6			**4**	**2**	**67**	4		
PAH																				
Acenaphthene	µg/L	1							<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Acenaphthylene	µg/L	1							<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Anthracene	µg/L	1							<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Benz(a)anthracene	µg/L	1							<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Benzo(a) pyrene	µg/L	0.5 : 1 (Interlab)							<0.5	<0.5	0	<0.5	<1	0	<0.5	<0.5	0	<0.5	<1	0
Benzo(g,h,i)perylene	µg/L	1							<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Benzo(k)fluoranthene	µg/L	1							<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Chrysene	µg/L	1							<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Benzo(b+j)fluoranthene	mg/l	0.001							<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
Dibenz(a,h)anthracene	µg/L	1							<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Fluoranthene	µg/L	1							<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Fluorene	µg/L	1							<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Indeno(1,2,3-c,d)pyrene	µg/L	1							<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Phenanthrene	µg/L	1							<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Pyrene	µg/L	1							<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
PAHs (Sum of total)	µg/L	0.5 : 1 (Interlab)							<0.5	<0.5	0	<0.5	<1	0	<0.5	<0.5	0	<0.5	<1	0
Inorganics																				
Alkalinity (Bicarbonate as CaCO3)	mg/l	1							344	340	1	344			131	120	9	131		
Total Phosphorus as P (Organic Phosphate as P)	mg/l	0.01	0.07	0.08	13	0.07			0.02	0.02	0	0.02			**0.85**	**0.08**	**166**	0.85		
Metals																				
Magnesium (Filtered)	mg/l	1							88	89	1	88			4870	4530	7	4870		
Arsenic	mg/l	0.001	<0.021	<0.021	0	<0.021	<0.05	0												
Arsenic (Filtered)	mg/l	0.001							<0.001	<0.001	0	<0.001	<0.05	0	<0.02	<0.02	0	<0.02	<0.001	0
Cadmium	mg/l	0.0001 : 0.0002 (Interlab)	<0.0021	<0.0021	0	<0.0021	<0.01	0												
Cadmium (Filtered)	mg/l	0.0001 : 0.0002 (Interlab)							<0.0001	<0.0001	0	<0.0001	<0.01	0	<0.002	<0.002	0	<0.002	<0.0002	0
Chromium (III+VI)	mg/l	0.001	<0.021	<0.021	0	<0.021	<0.05	0												
Chromium (III+VI) (Filtered)	mg/l	0.001							<0.001	<0.001	0	<0.001	<0.05	0	<0.02	<0.02	0	<0.02	<0.001	0
Copper	mg/l	0.001	<0.021	<0.021	0	<0.021	<0.05	0												
Copper (Filtered)	mg/l	0.001							<0.001	<0.001	0	<0.001			<0.02	<0.02	0	<0.02		
Lead	mg/l	0.001	<0.021	<0.021	0	<0.021	<0.05	0												
Lead (Filtered)	mg/l	0.001							<0.001	<0.001	0	<0.001			<0.02	<0.02	0	<0.02		
Mercury	mg/l	4e-005 : 1e-005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.00001	0												
Mercury (Filtered)	mg/l	4e-005							<0.00004	<0.00004	0	<0.00004			<0.0002	<0.0002	0	<0.0002		
Nickel	mg/l	0.001	<0.021	<0.021	0	<0.021	<0.05	0												
Nickel (Filtered)	mg/l	0.001							<0.001	<0.001	0	<0.001	<0.05	0	<0.02	<0.02	0	<0.02	<0.001	0
Zinc	mg/l	0.005	<0.105	<0.105	0	<0.105	<0.25	0												
Zinc (Filtered)	mg/l	0.005							<0.005	<0.005	0	<0.005	<0.25	0	<0.1	<0.1	0	<0.1	<0.005	0
Aluminium (Filtered)	mg/l	0.01 : 0.05 (Interlab)							0.02	0.02	0	0.02	<2.5	0	<0.2	<0.2	0	<0.2	<0.05	0
Iron (Filtered)	mg/l	0.05							<0.05	<0.05	0	<0.05	<2.5	0	<1	<1	0	<1	<0.05	0
Manganese (Filtered)	mg/l	0.001 : 0.005 (Interlab)							<0.001	0.001	0	<0.001	<0.25	0	**0.39**	**0.069**	**140**	**0.39**	**<0.005**	**195**
Perfluoroalkane Sulfonic Acids																				
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005 : 0.001 (Interlab)	0.0005	<0.0005	0	0.0005	<0.001	0	0.0113	0.0114	1	0.0113			**0.0057**	**0.0015**	**117**	0.0057		
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005		
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	0.0011	0.0011	0	0.0011			**0.0024**	**0.0017**	**34**	0.0024		
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005		
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002 : 0.0001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0	0.0017	0.0016	6	0.0017			0.0013	0.0012	8	0.0013		
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005		
Perfluoroalkane Carboxylic Acids																				
Perfluorobutanoic acid (PFBA)	µg/L	0.002 : 0.05 (Interlab)	0.0165	0.0142	15	0.0165	<0.05	0	0.0752	0.0782	4	0.0752			**0.0383**	**0.0196**	**65**	0.0383		
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005 : 0.01 (Interlab)	0.0765	0.0715	7	**0.0765**	**0.05**	**42**	0.14	0.142	1	0.14			**0.0603**	**0.0411**	**38**	0.0603		
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005 : 0.01 (Interlab)	0.0611	0.0619	1	**0.0611**	**0.04**	**42**	0.122	0.112	9	0.122			**0.0349**	**0.017**	**69**	0.0349		
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005 : 0.01 (Interlab)	0.0178	0.0194	9	**0.0178**	**0.01**	**56**	0.137	0.138	1	0.137			**0.0239**	**0.0071**	**108**	0.0239		
Perfluorooctanoic acid (PFOA)	µg/L	0.0005 : 0.01 (Interlab)	0.0029	0.0028	4	0.0029	<0.01	0	0.0734	0.0712	3	0.0734			**0.0048**	**0.0017**	**95**	0.0048		
Perfluorononanoic acid (PFNA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	0.0226	0.021	7	0.0226			**0.0015**	**<0.0005**	**100**	0.0015		
Perfluorodecanoic acid (PFDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005		
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005		
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005		
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005		
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005			**<0.0005**	**0.0009**	**57**	<0.0005		
(n:2) Fluorotelomer Sulfonic Acids																				
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001		
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001		
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001		
Perfluoroalkyl Sulfonamides																				
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.05	0	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005		
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.05	0	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001		
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.05	0	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001		
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.05	0	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005		
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.05	0	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005		
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.05	0	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001		
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.05	0	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001		

Table 4b
QAQC - Water RPD%
Perdaman Urea Project
754-PEREN295751

		Lab Report Number	EP2201196	EP2201196		EP2201196	Interlab D		EP2201691	EP2201691		EP2201691	Interlab D		EP2201691	EP2201691		EP2201691	Interlab D	
		Field ID	SW5	QC36	**RPD**	SW5	QC37	**RPD**	MW010	QC01	**RPD**	MW010	QC02	**RPD**	MW08	QC06	**RPD**	MW08	QC07	**RPD**
		Sampled Date/Time	29-01-22	29-01-22		29-01-22	29-01-22		09-02-22 15:00	09-02-22 15:00		09-02-22 15:00	09-02-22 15:00		09-02-22 15:00	09-02-22 15:00		09-02-22 15:00	09-02-22 15:00	
PFAS																				
Sum of PFAS (WA DER List)	µg/L	0.0002 : 0.005 (Interlab)	0.175	0.17	3	**0.175**	**0.126**	**33**	0.562	0.556	1	0.562			**0.172**	**0.0909**	**62**	0.172		
Sum of PFHxS and PFOS	µg/L	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.001	0	0.0028	0.0027	4	0.0028			0.0037	0.0029	24	0.0037		
Sum of PFAS	µg/L	0.0002 : 0.005 (Interlab)	0.175	0.17	3	**0.175**	**0.126**	**33**	0.584	0.576	1	0.584			**0.173**	**0.0918**	**61**	0.173		
BTEX																				
Benzene	µg/L	1							<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Toluene	µg/L	2 : 1 (Interlab)							<2	<2	0	<2	<1	0	<2	<2	0	<2	<1	0
Ethylbenzene	µg/L	2 : 1 (Interlab)							<2	<2	0	<2	<1	0	<2	<2	0	<2	<1	0
Xylene (m & p)	µg/L	2							<2	<2	0	<2	<2	0	<2	<2	0	<2	<2	0
Xylene (o)	µg/L	2 : 1 (Interlab)							<2	<2	0	<2	<1	0	<2	<2	0	<2	<1	0
Xylene Total	µg/L	2 : 3 (Interlab)							<2	<2	0	<2	<3	0	<2	<2	0	<2	<3	0
Total BTEX	µg/L	1							<1	<1	0	<1			<1	<1	0	<1		
Total Recoverable Hydrocarbons																				
C10 - C40 (Sum of total)	mg/l	0.1							<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
Polycyclic Aromatic Hydrocarbons																				
Naphthalene	µg/L	5 : 1 (Interlab)							<5	<5	0	<5	<1	0	<5	<5	0	<5	<1	0
Naphthalene	µg/L	1							<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Benzo(a)pyrene TEQ calc (Zero)	mg/l	0.0005 : 0.001 (Interlab)							<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Other																				
Acidity (as CaCO3)	mg/l	1 : 10 (Interlab)							<1	<1	0	**<1**	**50**	**192**	45	35	25	**45**	**<10**	**127**
Diethanolamine	mg/l	0.001 : 0.5 (Interlab)	<0.01	<0.01	0	<0.01	<1	0	<0.01	<0.01	0	<0.01	<1	0	<0.01	<0.01	0	<0.01	<1	0
Ethanolamine	mg/l	0.001 : 0.5 (Interlab)	<0.01	<0.01	0	<0.01	<1	0	<0.01	<0.01	0	<0.01	<1	0	<0.01	<0.01	0	<0.01	<1	0
Methyldiethanolamine	mg/l	0.001 : 0.05 (Interlab)	<0.01	<0.01	0	<0.01	<0.05	0	<0.01	<0.01	0	<0.01	<0.05	0	<0.01	<0.01	0	<0.01	<0.05	0
PCBs																				
PCBs (Sum of total)	µg/L	1	<1	<1	0	<1	<1	0												
TPH																				
F1 (C6-C10) less BTEX	mg/l	0.02							<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
F2 C10-C16 (minus Naphthalene)	mg/l	0.1 : 0.05 (Interlab)							<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	0.05	0
C6 - C9	mg/l	0.02							<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
C10 - C14	mg/l	0.05							<0.05	<0.05	0	**<0.05**	**0.07**	**33**	<0.05	<0.05	0	<0.05	<0.05	0
C15 - C28	mg/l	0.1							<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	0.1	0
C29-C36	mg/l	0.05 : 0.1 (Interlab)							<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
+C10 - C36 (Sum of total)	mg/l	0.05 : 0.1 (Interlab)							<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	**<0.05**	**0.1**	**67**
F1 (C6-C10)	mg/l	0.02							<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0
F2 (C10-C16 Hydrocarbons)	mg/l	0.1 : 0.05 (Interlab)							<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	0.05	0
F3 (C16-C34 Hydrocarbons)	mg/l	0.1							<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
C34-C40	mg/l	0.1							<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0

Attachment J - MS1180 Letter to EPA CEO on Conditions 6 & 7

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Chairman – Perdaman Chemicals and Fertilisers

Perdaman
Alluvion Building, Level 17
58 Mounts Bay Road
Perth, WA, 6000

Regulator Reference: Ministerial Statement No. 1180
Hydrogeological Management and Acid Sulfate Soils

20 April 2022

Dear

Re: Perdaman Urea Project, Ministerial Statement No. 1180: Condition 6 – Hydrogeological Management and Condition 7 – Acid Sulfate Soils

I am writing to you with regards to EPC Contractors response to the requirements stipulated by Condition 6 – Hydrogeological Management and Condition 7 – Acid Sulfate Soils, within Ministerial Statement 1180:

6. Hydrogeological management

…

6-2 At least six months prior to Ground Disturbing Activities, the proponent shall provide the CEO with the results of supplementary detailed hydrogeological studies undertaken by or on behalf of the proponent to quantify baseline groundwater quality, groundwater flow directions, and the depth to groundwater beneath Sites C and F shown on Figure 2…

6-3 In the event that the studies referred to in condition 6-2 indicate that dewatering would be required during construction, the proponent shall develop in consultation with the Murujuga Aboriginal Corporation, and submit to the CEO together with the studies referred to in condition 6-2 a Hydrogeological Management Plan…

7. Acid sulfate soils

7-1 The proponent shall undertake intrusive acid sulfate soils investigations in accordance with the requirements of the Department of Water and Environmental Regulations guideline on the Identification and investigation of acid sulfate soils and acidic landscapes (DER 2015) at least six months prior to Ground Disturbing Activities…

7-2 In the event that acid sulfate soils are disturbed during the implementation of the proposal, the proponent shall treat and manage acid sulfate soils in accordance with the requirements of the Department of Water and Environmental Regulation's guideline on the Treatment and management of soil and water in acid sulfate soil landscapes (DER, 2015).

<u>Condition 6-2</u>

A detailed hydrogeological study has been undertaken by Tetra Tech Coffey (Coffey) between December 2021 and March 2022 (**Attachment 1**). The study quantifies baseline groundwater quality, groundwater flow directions, and the depth to groundwater beneath Sites C and F at the proposed Perdaman Urea Project.

The EPA requested that the Hydrogeological Study be subject to an independent Peer Review. Steve Morrison from Senversa was engaged to conduct this review. Senversa's review is provided as **Attachment 2**.

Condition 6-3

Through continual improvement and refinement of the causeway design and civil works associated with Sites C and F, the EPC Contractor can confirm that dewatering will not be required during construction.

The construction of the causeway connecting Sites C and F across the supratidal flats shall be built on grade and will not require the need to excavate or dewater. A cross-section of the latest causeway design is provided in **Attachment 3.**

Sites C and F are situated to the east of Burrup Road causeway, on either side of the Hearson Cove/King Bay tidal flats. The supratidal flats area is known to be subject to flooding from storm surge events (S 4.2 Environmental Review Document, Cardno, March 2020). The lower elevations of both Sites C and F are required to be raised above +6m AHD which will comprise between 1 and 4m of fill. It is anticipated that all services will be located within this fill material. Cut maps for both Site C and F are presented in **Attachment 5 and 6** respectively. The Cut is represented by the light beige whilst the balance of the site is subject to Fill. A cross section is also presented in **Attachment 3**.

The EPC Contractor is therefore not considering dewatering during construction and is advising PCF that a *Hydrogeological Management Plan* will **not** be required as per condition 6-3.

Condition 7-1

The EPC Contractor on behalf of Perdaman engaged Coffey to undertake a Detailed Site Assessment for Acid Sulfate Soils (ASS) investigation. The investigation was conducted in January and the consequent report is provided in **Attachment 4**.

The investigation findings comprised:

- **No** actual acidity exists in the form of S-TAA indicating that there is no soluble and exchangeable acidity within the soil profile.
- Analysis for maximum peroxide 'oxidisable' sulfur present in the soil (SPOS) exceeded the DER ASS guideline of 0.03 %S in nine samples, and
- Potential Acid Sulfate Soils have been confirmed, however are located within the Supratidal zones (refer to figures in **Attachment 5 and 6**).

Coffey concluded:

- Chloride:sulfate ratios indicate groundwater has not been affected by oxidation of sulfides,
- Hydrogeological system has a low vulnerability to acidification based on groundwater chemistry,
- Low acidity and high alkalinity concentrations indicating minimal influence from historical acidification and inherent buffering capacity, and
- Dissolved aluminium concentrations generally below detection with only two samples detected below relevant criteria.

Ground disturbance activities associated with construction will involve earthworks or cut and fill activities where soil and rock from above 6 mAHD across Site C and above 10 mAHD across Site F will be excavated and used as fill material for raising the site to +6m AHD and for the construction of a causeway running between Site C and Site F.

No Actual or Potential Acid Sulfate Soils (AASS and PASS respectively) are present within the EPC Contractors "cut" locations as presented in **Attachment 5 and 6**.

Causeway Design Considerations

Two samples within the causeway footprint have been identified as PASS. The causeway design was considered in relation to both managing dewatering and Acid Sulfate Soils.

The base of the causeway is 2 mAHD which is existing ground surface level within the supratidal and intertidal zone. Approximate three meters of sand bedding will be applied above this level with concrete culverts embedded within sand to permit the flow of stormwater from east to west across the supratidal and intertidal areas of the Site. A compacted fill layer 1.7 m thick will then be placed on top of the sand bedding layer to provide a base for final causeway road layers such as crushed aggregate and asphalt. Fill material will be used primarily on top of sand bedding to stabilise the causeway surface before final layers such as crushed aggregate, granular materials and asphalt are applied. The finished grade will be 6.15 mAHD.

Based on the findings of the Coffey Acid Sulfate Soil Investigation and a review of the EPC causeway and civil design information, the EPC Contractor is therefore not anticipating disturbing Acid Sulfate Soils during the construction of the Project.

Yours sincerely,

Environmental Manager

Clough Saipem Joint Venture

Attachment K – GHD SWMP Cover Letter and Peer Review Comments

999 Hay Street, Level 10
Perth, Western Australia 6000
Australia
www.ghd.com

Your ref:
Our ref: 12572758

22 April 2022

Clough Projects Australia Pty Ltd
Level 9, Alluvion Building
58 Mounts Bay Road
Perth WA 6000

Perdaman Project Destiny – Burrup Strategic Industrial Area – Surface Water Management Plan Peer Review Independent Review Advice

Dear Simon

GHD is pleased to provide Clough on behalf of Saipam Clough Joint Venture (SCJV) with peer review advice related to the Surface Water Management Plan (SWMP) report for the Perdaman Urea Project, located within the Burrup Strategic Industrial Area, Burrup Peninsula, Western Australia (the site).

1. Project Appreciation

Western Australian Environmental Protection Authority (EPA) assessment report 1705 (dated 1 September 2021) sets out what the EPA considered to be the key environmental factors relating to the Perdaman Urea Project site and associated recommended conditions to which implementation should be subject.

The assessment report is for the WA regulators and considers the key environmental factors identified for the project.

The EPA considers that the likely residual impacts of the proposal on inland waters are:
a) impacts to surface water quality from stormwater run-off and project infrastructure, which is unlikely to be material
b) impacts to groundwater from potential abstraction and saline wastewater discharge to the Water Corporation's Multi-User Brine Return Line (MUBRL), which is likely to be consistent with the EPA objective for inland waters, provided appropriate management measures are implemented
c) potential impacts to surface water and groundwater from the disturbance of acid sulphate soils, which is likely to be consistent with the EPA objective for inland waters, provided appropriate management measures are implemented.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

- The EPA considers that the proposal is likely to be consistent with the principles of the EP Act and EPA objective for inland waters if subject to the EPA's recommended conditions.

Ministerial Statement 1180, Condition 8-1

The proponent shall implement the proposal to achieve the following environmental objective:

- maintain the hydrological regimes and quality of surface water so that environmental values are protected.

The Proponent is required to meet Condition 8-2:

At least six months prior to Ground Disturbing Activities within the development envelope delineated in Figure 2, or such lesser time approved in writing by the CEO, the proponent shall in consultation with the Murujuga Aboriginal Corporation, revise and submit to the CEO the Surface Water Management Plan, Perdaman Urea Project Burrup Peninsula, Western Australia (Version PCF 1, 24 January 2021) which shall:

(1) demonstrate how the environmental objective in condition 8-1 will be achieved; EPA Victoria 2006, Hydrogeological Assessment (Groundwater Quality) Guidelines, September 2006.

(2) specify the treatment and management of potential acid sulfate soils in accordance with the requirements of condition 7-1 and condition 7-2; (3)

(3) specify trigger criteria that will trigger the implementation of management and/or contingency actions to prevent direct or indirect impacts;

(4) specify threshold criteria to demonstrate compliance with condition 8-1;

(5) specify monitoring methodology to determine if trigger criteria and threshold criteria have been met;

(6) specify management and/or contingency actions to be implemented if the trigger criteria required by condition 8-2(3) and/or the threshold criteria required by condition 8-2(4) have not been met; and

(7) provide the format and timing for the reporting of monitoring results against trigger criteria and threshold criteria to demonstrate that the objective in condition 8-1 has been met over the reporting period in the Compliance Assessment Report required by condition 15-6.

In the event that acid sulfate soils are disturbed during construction, the treatment and management of ASS will be addressed in accordance with Condition 7-1 and 7-2 of Ministerial Statement 1180.

Ministerial Statement 1180, Condition 7-1

The proponent shall undertake intrusive acid sulfate soils investigations in accordance with the requirements of the Department of Water and Environmental Regulation's guideline on the Identification and investigation of acid sulfate soils and acidic landscapes (DER 2015) at least six months prior to Ground Disturbing Activities

The Proponent is required to meet Condition 7-2:

In the event that acid sulfate soils are disturbed during the implementation of the proposal, the proponent shall treat and manage acid sulfate soils in accordance with the requirements of the Department of Water and Environmental Regulation's guideline on the Treatment and management of soil and water in acid sulfate soil landscapes (DER, 2015)

2. Review Objectives

The objective of the review was to assess the quality and completeness of the SWMP with reference to the requirements of MS 1180 Condition 8-2 and compliance with relevant aspects of the guidelines stipulated in the ministerial condition.

The EPAs objective is to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected (as detailed within the *Statement No.1180 Perdaman Urea Project*, section 8). Activities that have the potential to impact these values are plant and infrastructure layout and design, construction and operational activities. The Surface Water Management Plan, is to be submitted under condition 8.2, as part of satisfying the condition 8.2 of Statement *No.1180 Perdaman Urea Project,* so this links the ASSMP and timeframe to the 6 month period and Section 7 to " (2) specify the treatment and management of potential acid sulfate soils in accordance with the requirements of condition 7-1 and condition 7-2.

Therefore GHD, considers that this infers that the ASSMP is developed along with the SWMP, to a similar level and perhaps be contained within its own subplan, within the overarching Project Environmental Management Plan (PEMP) for the Perdaman Urea Project (detailed within the SWMP).

3. Scope of Work and Methodology

The scope of work included review of the following report:

– Perdaman Urea Project – Project Destiny – Surface Water Management Plan, Perdaman Chemicals and Fertilisers Pty Ltd, dated 1st February 2022, PCF 2.

The review was completed by Vincent Tran and Steve Lawrence with reference to the following guidelines and specific requirements of MS Condition 7-2 and 8-2 :

– How to prepare *Environmental Protection Act 1986* Part IV Environmental Management Plan – Instructions – Environmental Protection Authority (October 2021)
– Environmental outcomes and outcomes-based conditions – Interim Guidance – Environmental Protection Authority (October 2021)
– DER guidelines on the Treatment and management of soil and water in acid sulfate soil landscapes (DER, 2015)
– ANZECC and ARMCANZ, 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1 – The Guidelines. National Water Quality Management Strategy Paper No.4. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra, ACT.

4. Summary Findings

GHD have completed a review of the SWMP report with respect to Ministerial Statement 1180, Condition 8-1 and with consideration to the particular requirements of MS Condition 8-2.

Associated with potential groundwater and surface water impacts during construction and operation of the plant, acid sulfate soils have the potential to impact the quality of surface and groundwater, with Section 7 of the *Statement No.1180 Perdaman Urea Project* , specifically related to undertaking an Acid Sulfate Soils (ASS) Investigation within 6 months prior to disturbance AND where ASS are disturbed, they are to be treated and managed in accordance with the DER guidelines on the Treatment and management of soil and water in acid sulfate soil landscapes (DER, 2015). Other ASS guidelines are also referenced in the document and DER website, as part of overall management guidance.

Demonstration of the ASS management strategy, including No. 1 avoidance, and that all reasonable and practical measures have been taken to ensure surface and groundwater quality has been maintained with respect to Acid Sulfate Soils (ASS) has not been fully addressed as noted in Section 5. Although minimisation measures have been proposed through the implementation of a Surface Water Management Plan, Perdamam Urea Project Burrup Peninsula, WA (PCF 2), the level of risk has not been fully quantified or evidence that avoidance by design (key management control) has been adopted.

Subject to the comments in Section 5 being satisfactorily addressed during report finalisation, the SWMP is considered to appropriately meet the requirements of MS Condition 8-2 and has been prepared in general accordance with relevant aspects of the nominated regulatory guidelines (also having regard to the terms of reference qualified in Section 3 of this letter).

5. Detailed Findings

Table 1 Review Comments

Reference (page/sheet number)	**Reviewer comment**	**Comment category**
Executive Summary – Key environmental factors and objectives	The executive summary notes that in the event that acid sulfate soils are disturbed during construction, the treatment and management of ASS will be addressed in this SWMP in accordance with Condition 7-1 and 7-2 of MS 1180. Condition 7-1 of 1180 advised that the proponent shall undertake intrusive acid sulfate soils investigations in accordance with the requirements of the Department of Water and Environmental Regulation's guideline on the Identification and investigation of acid sulfate soils and acidic landscapes (DER 2015) at least six months prior to Ground Disturbing Activities. ASS identification and an Acid Sulphate Management Plan is required 6 months prior to Ground Disturbing Activities, not during Ground Disturbing Activities.	Major
Section 1.2.1.4	Section 1.2.1.4, have a reported presence and that the proponent is required to investigate and manage as per Condition 7-1 of the Ministerial Statement (1180), and if identified, treat and manage as per the guidelines. Figure 1-7, identifies Potential ASS of the Project Location, based on elevation/geomorphology only and indicates that areas of high to moderate risk are present to the south of Area C and in the causeway location. This figure suggests the risks are significant but these have not been quantified for the development so far, although mention in the Geotechnical Risk Assessment App, 3c, item No. 3 & 16 need to consider ASS and No. 20, does not address all ASS risks and should not be based on prediction of ASS or field sampling, this should be known beforehand and managed under ASSMP.	Major
Table 1-3	Key environmental factors and project activities impacting surface waters associated with ASS (from Table 1-3) are: • Clearing, grubbing, excavations, cut & fill (including potential heave and expulsion of pore water and stockpiling ASS material) • Access tracks (including the causeway and activities in lower elevations and intertidal areas) • Construction of the causeway and potential changes to tidal flows (restricting rewetting and drying regimes and potential drying out and oxidation of ASS • Short and long term construction impacts	Major

Reference (page/sheet number)	Reviewer comment	Comment category
	Design also needs to be considered as a project activity that may have an associated ASS impact to surface and groundwaters as well as affecting soil properties and contaminating, also may be associated infrastructure impacts (e.g. acidic corrosion of materials).	
Table 2-1	Key EPA factors and Objectives associated with ASS (from Table 2-1) for inland waters are: • Key Impacts and risks – increased acidity with surface and groundwaters from disturbance of ASS Additional Trigger Criterion 1, that should be considered for inclusion are: • Iron and precipitate flocks (reaction products from ASS) • Clear water, indicative of dissolved aluminium and acidic conditions	Minor
Table 2.1	Management Action 9 - need to include that ASS stockpiles managed under the ASSMP	Minor
Table 2.1	Management Action 11 – Ground Disturbance Permit, does not include the "management target" for ASS, and should be included, this needs to be identified and marked out on site	Minor
Table 2.1	Management Action 12 indicates an ASS investigation will be undertaken as per the DER 2015 guidelines, at least 6 months prior to Ground Disturbing Activities as per condition 7-1, and that if ASS are disturbed, EPC shall treat and manage ASS in accordance with the guidelines. The ASS investigation is indicated to be in progress. Will there be an opportunity to use this information in design to minimise disturbance?	Minor
Table 2.1	The Management Actions 13 indicates undertaking MA14 to evaluate groundwater conditions and to evaluate ASS risks and if identified, an ASS treatment / management plan is to be developed in accordance with the guidelines. This ASSMP is to be submitted for approval. Additional key items to address as a management target in the ASSMP include ASS material reuse/disposal, engineering design to minimise disturbance (key strategy) and associated risks, where required. Management Action 3 Erosion and sedimentation, the placement and design of SW infrastructure may also need to address ASS in construction and operation, so include in ASSMP. Management Action 13, does not have a monitoring or action criteria, which needs to be defined.	Minor
Table 2.1	Management Action Criteria 14 "Reporting" is not consistent with groundwater monitoring and results of field testing provided to HSSE manager prior to ground disturbing activities related to soil testing, are not	Minor

Reference (page/sheet number)	**Reviewer comment**	**Comment category**
	consistent with ASS management intent, in that there is prior knowledge of ASS soils and conditions and adoption of management hierarchy measures is required prior to disturbance and to allow for scheduling and planning. Any ground truthing will also require quantitative analysis and allow sufficient lead time to manage any potential impacts. Monitoring of treatment through validation and confirmation of management performance is to be reported, including non -compliances, along with water and groundwater monitoring.	
Table 2.1	Management Actions 15, 16 (aligning with groundwater plan also), 17, 18, 19, and 20, 21,22, should be further addressed in the ASSMP, with targets assigned such as: • Delineation and documentation of all ASS which may be disturbed by site works and excavation and / or filling to occur only in those areas where disturbance is absolutely necessary • Following treatment of ASS soils, the target is to achieve 50% or more neutralising capacity than the sum of existing and potential acidity (i.e. confirmed by collection and analysis of verification samples) • Confirmation that any containment measures (i.e. bunds) are intact and that records be kept of effectiveness and augmentation of these facilities • During and after works, the physical parameters, including pH of groundwater and surface water are not to significantly vary or fall below the values that exist onsite, prior to the works commencing and groundwater level is maintained above PASS during and after works • Confirmation that handling and storage of hazardous materials is undertaken in accordance with relevant legislation and regulations (including Dangerous Goods) and that records are kept of said handling and storage • All personnel involved in the works have undertaken appropriate training for their role in the project with regards to management of ASS and this is documented • Handling, treatment, reuse and long term storage of ASS is demonstrated etc.	Minor
Table 2.1	Management Action 20, need to address a long term disposal/reuse option for treated ASS, may not be geotechnically suitable, may leach reaction products to the environment, will require capping and long term management (not to be disturbed), may be saline.	Minor
Table 2.1	Management Action 21 requires an assessment of risk, and mitigation measures as required (i.e sheet piling, caisson construction). Works to be avoided and / or minimised in ASS areas include: • Construction of drains etc. which lower the groundwater table • Uncontrolled groundwater extraction and drawdown from dewatering bores	Minor

Reference (page/sheet number)	**Reviewer comment**	**Comment category**
	• Uncontrolled dewatering in excavations • Water re-injection into surrounding aquifers. Ongoing groundwater monitoring and reporting is indicated to be required (MA 16) that will be required to be continued prior to and throughout the construction period. Data obtained from baseline and ongoing monitoring will support groundwater management strategies (to be confirmed) at the site, which should aim to minimise the potential for the development of an oxidising environment in the subsurface at and away from the excavated/disturbed areas and hence reduce the potential for the generation of acidic ground conditions where limited ability may exist for its management. This aligns with EPAs summary of residual impacts of proposal (EPA report 1705). Potential impacts to surface water and groundwater as a result of the disturbance of acid sulphate soils are likely to be consistent with maintenance of groundwater hydrological regimes and quality provided that appropriate management measures are implemented. So, need to evaluate design with ASS and groundwater (although risk may be considered low as limited disturbance expected, principally causeway and in marine area).	
Report in general	Fix broken reference links	Minor

6. Closure

If you have any comments or questions, please do not hesitate to contact the undersigned at

Regards

Senior Drainage Engineer

6222 8885
Vincent.tran@ghd.com

Attachment L – W6630/2021/1

Government of Western Australia
Department of Water and Environmental Regulation

Works Approval

Works approval number	W6630/2021/1
Works approval holder	Perdaman Chemicals and Fertilisers Pty Ltd
ACN	121 263 741
Registered business address	Alluvion Building, Level 17, 58 Mounts Bay Road PERTH WA 6000
DWER file number	DER2021/000654
Duration	14/07/2022 to 13/07/2027
Date of issue	14/07/2022
Premises details	Perdaman Urea Project Part of Lot 3016 on DP42282 Crown Land Title Volume LR3139 Folio 39 Part of Lot 3015 on DP42282 Crown Land Title Volume LR3139 Folio 38 Part of Lot 3012 on DP42282 Crown Land Title Volume LR3139 Folio 35 Part of Lot 553 on DP406755 Crown Land Title Volume LR3167 Folio 958 Part of Lot 556 on DP406755 Crown Land Title Volume LR3167 Folio 961 Part of Lot 557 on DP406755 Crown Land Title Volume LR3167 Folio 962 As defined by the premises maps attached to the issued works approval

Prescribed premises category description (Schedule 1, *Environmental Protection Regulations 1987*)	Assessed production / design capacity
Category 12: Screening etc. of material: premises (other than premises within category 5 or 8) on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated.	450,000 tonnes per year

This works approval is granted to the works approval holder, subject to the attached conditions, on 14 July 2022, by:

Paul Newell
Senior Manager, Process Industries
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Works approval history

Date	Reference number	Summary of changes
14 July 2022	W6630/2021/1	Works approval granted.

Interpretation

In this works approval:

(a) the words 'including', 'includes' and 'include' in conditions mean "including but not limited to", and similar, as appropriate;

(b) where any word or phrase is given a defined meaning, any other part of speech or other grammatical form of that word or phrase has a corresponding meaning;

(c) where tables are used in a condition, each row in a table constitutes a separate condition;

(d) any reference to an Australian or other standard, guideline, or code of practice in this works approval:

  (i) if dated, refers to that particular version; and

  (ii) if not dated, refers to the latest version and therefore may be subject to change over time;

(e) unless specified otherwise, any reference to a section of an Act refers to that section of the EP Act; and

(f) unless specified otherwise, all definitions are in accordance with the EP Act.

NOTE: This works approval requires specific conditions to be met but does not provide any implied authorisation for other emissions, discharges, or activities not specified in this works approval.

Works approval conditions

The works approval holder must ensure that the following conditions are complied with:

Construction phase

Infrastructure and equipment

1. The works approval holder must:

(a) construct and/or install the infrastructure and/or equipment;

(b) in accordance with the corresponding design and construction / installation requirements; and

(c) at the corresponding infrastructure location; and

(d) within the corresponding timeframe,

as set out in Table 1.

Table 1: Design and construction / installation requirements

Infrastructure	Design and construction / installation requirements	Infrastructure location
Crushing and screening circuit	Metso Lokotrack LT125 Mobile Crushing Plant Transfer conveyors Kleemann MS19D Track Screen Komatsu WA600 loader Dust suppression sprays installed at material transfer locations on the Jaw Crusher, Cone Crushers (2), Triple Deck Screen and product stackers (3). Plant to be equipped with exhaust mufflers from the Original Equipment Manufacturer (OEM) or systems meeting or exceeding the OEM specifications Earthen bund around the premises boundary to prevent surface water run-off from the crushing and screening plant and associated processed material stockpiles being discharged from the premises.	Figures 2 and 3

Compliance reporting

2. The works approval holder must within 30 calendar days of all infrastructure or equipment required by condition 1 being constructed and/or installed:

(a) undertake an audit of their compliance with the requirements of condition 1; and

(b) prepare and submit to the CEO an Environmental Compliance Report on that compliance.

3. The Environmental Compliance Report required by condition 2, must include as a minimum the following:

(a) certification by an authorised representative of the works approval holder that the items of infrastructure or component(s) thereof, as specified in condition 1, have been constructed in accordance with the relevant requirements specified in condition 1;

(b) as constructed plans and a detailed site plan for each item of infrastructure or component of infrastructure specified in condition 1; and

(c) be signed by a person authorised to represent the works approval holder and contains the printed name and position of that person.

Time limited operations phase

Commencement and duration

4. The works approval holder may only commence time limited operations for an item of infrastructure identified in condition 1 where the Environmental Compliance Report as required by condition 2 has been submitted by the works approval holder for that item of infrastructure.

5. The works approval holder may conduct time limited operations for an item of infrastructure specified in condition 1 (as applicable):

(a) for a period not exceeding 180 calendar days from the day the works approval holder meets the requirements of condition 3 for that item of infrastructure; or

(b) until such time as a licence for that item of infrastructure is granted in accordance with Part V of the *Environmental Protection Act 1986*, if one is granted before the end of the period specified in condition 5(a).

Time limited operations requirements

6. During time limited operations, the works approval holder must ensure that the premises infrastructure and equipment listed in Table 2 and located at the corresponding infrastructure location is maintained and operated in accordance with the corresponding operational requirement set out in Table 2.

Table 2: Infrastructure and equipment requirements during time limited operations

Site infrastructure and equipment	Operational requirement	Infrastructure location
Crushing and screening circuit	- The mobile crushing and screening plant must operate only at locations within the clearing boundary specified in Figure 4 and Figure 5. - Water systems to be used to minimise dust generation at material transfer points, crusher and at the materials stockpiles. - Chemical dust suppressants or water trucks to be operated on roads and open areas to ensure dust generation is kept to a minimum. - Stockpiles must not exceed 5 m in height above ground level.	Schedule 1 Figures 2 and 3

Compliance reporting

7. The works approval holder must submit to the CEO a report on the time limited operations within 30 calendar days of the completion date of time limited operations or 60 calendar days before the expiration date of the works approval, whichever is the sooner.

8. The works approval holder must ensure the report required by condition 7 includes the following:

(a) a summary of the time limited operations, including timeframes and amount of rock excavated and processed;

(b) a review of performance and compliance against the conditions of the works approval; and

(c) where the manufacturer's design specifications and the conditions of this works approval have not been met, what measures will the works approval holder take to meet them, and what timeframes will be required to implement those measures.

Records and reporting (general)

9. The works approval holder must record the following information in relation to complaints received by the works approval holder (whether received directly from a complainant or forwarded to them by the Department or another party) about any alleged emissions from the premises:

(a) the name and contact details of the complainant, (if provided);

(b) the time and date of the complaint;

(c) the complete details of the complaint and any other concerns or other issues raised; and

(d) the complete details and dates of any action taken by the works approval holder to investigate or respond to any complaint.

10. The works approval holder must maintain accurate and auditable books including the following records, information, reports, and data required by this works approval:

(a) the works conducted in accordance with condition 1;

(b) any maintenance of infrastructure that is performed in the course of complying with condition 6; and

(c) complaints received under condition 9.

11. The books specified under condition 10 must:

(a) be legible;

(b) if amended, be amended in such a way that the original version(s) and any subsequent amendments remain legible and are capable of retrieval;

(c) be retained by the works approval holder for the duration of the works approval; and

(d) be available to be produced to an inspector or the CEO as required.

Definitions

In this works approval, the terms in Table have the meanings defined.

Table 3: Definitions

Term	Definition
books	has the same meaning given to that term under the EP Act.
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department administering the *Environmental Protection Act 1986* Locked Bag 10 Joondalup DC WA 6919 info@dwer.wa.gov.au
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V Division 3 of the EP Act.
discharge	has the same meaning given to that term under the EP Act.
emission	has the same meaning given to that term under the EP Act.
Environmental Compliance Report	means a report to satisfy the CEO that the conditioned infrastructure and/or equipment has been constructed and/or installed in accordance with the works approval.
EP Act	*Environmental Protection Act 1986* (WA).
EP Regulations	*Environmental Protection Regulations 1987* (WA).
premises	the premises to which this licence applies, as specified at the front of this licence and as shown on the premises map (Figure 1) in Schedule 1 to this works approval.
prescribed premises	has the same meaning given to that term under the EP Act.
time limited operations	refers to the operation of the infrastructure and equipment identified under this works approval that is authorised for that purpose, subject to the relevant conditions.
works approval	refers to this document, which evidences the grant of the works approval by the CEO under section 54 of the EP Act, subject to the conditions.
works approval holder	refers to the occupier of the premises being the person to whom this works approval has been granted, as specified at the front of this works approval.

END OF CONDITIONS

Schedule 1: Maps

Premises map

The boundary of the prescribed premises is shown in the map below (

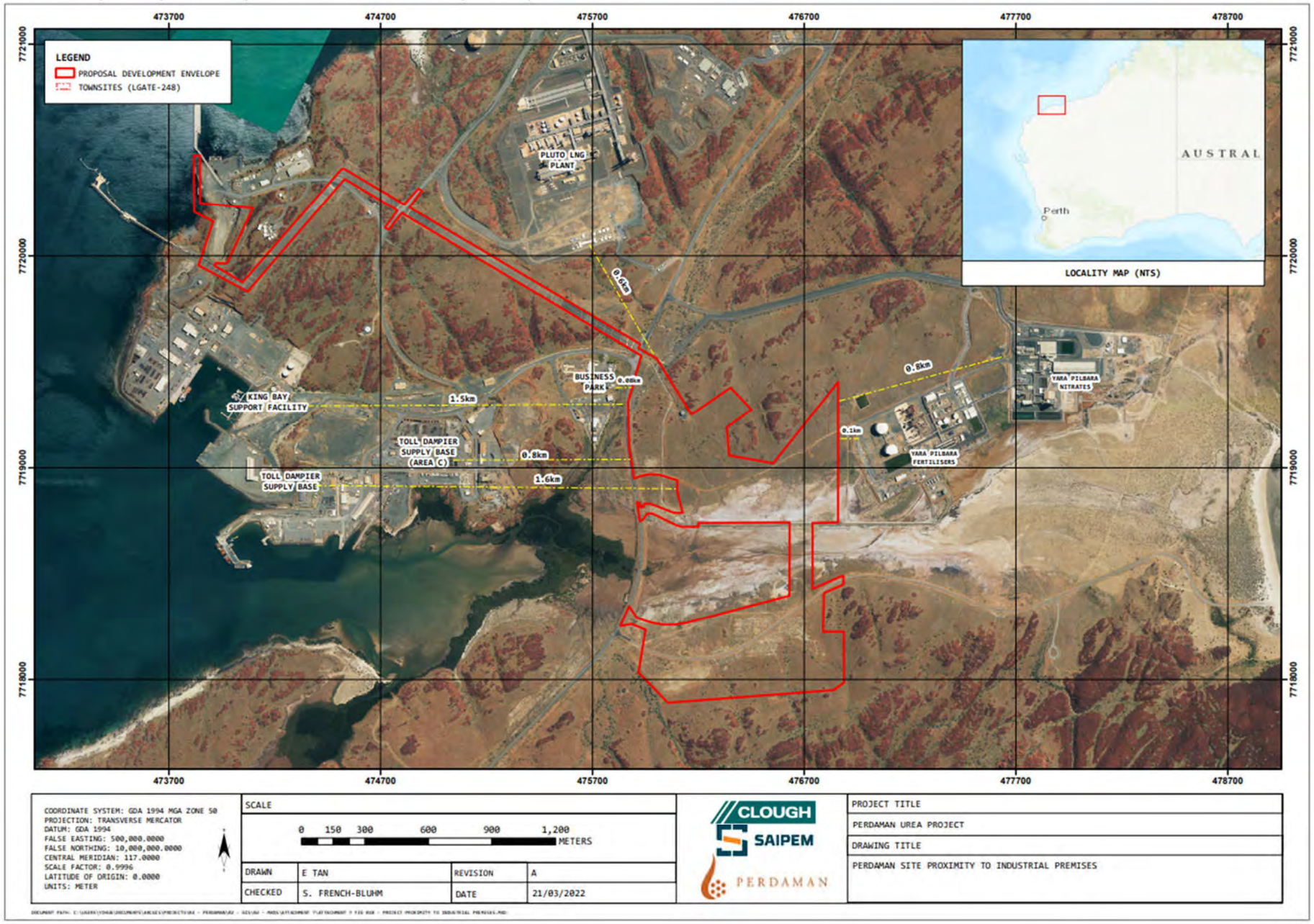


Figure 1).

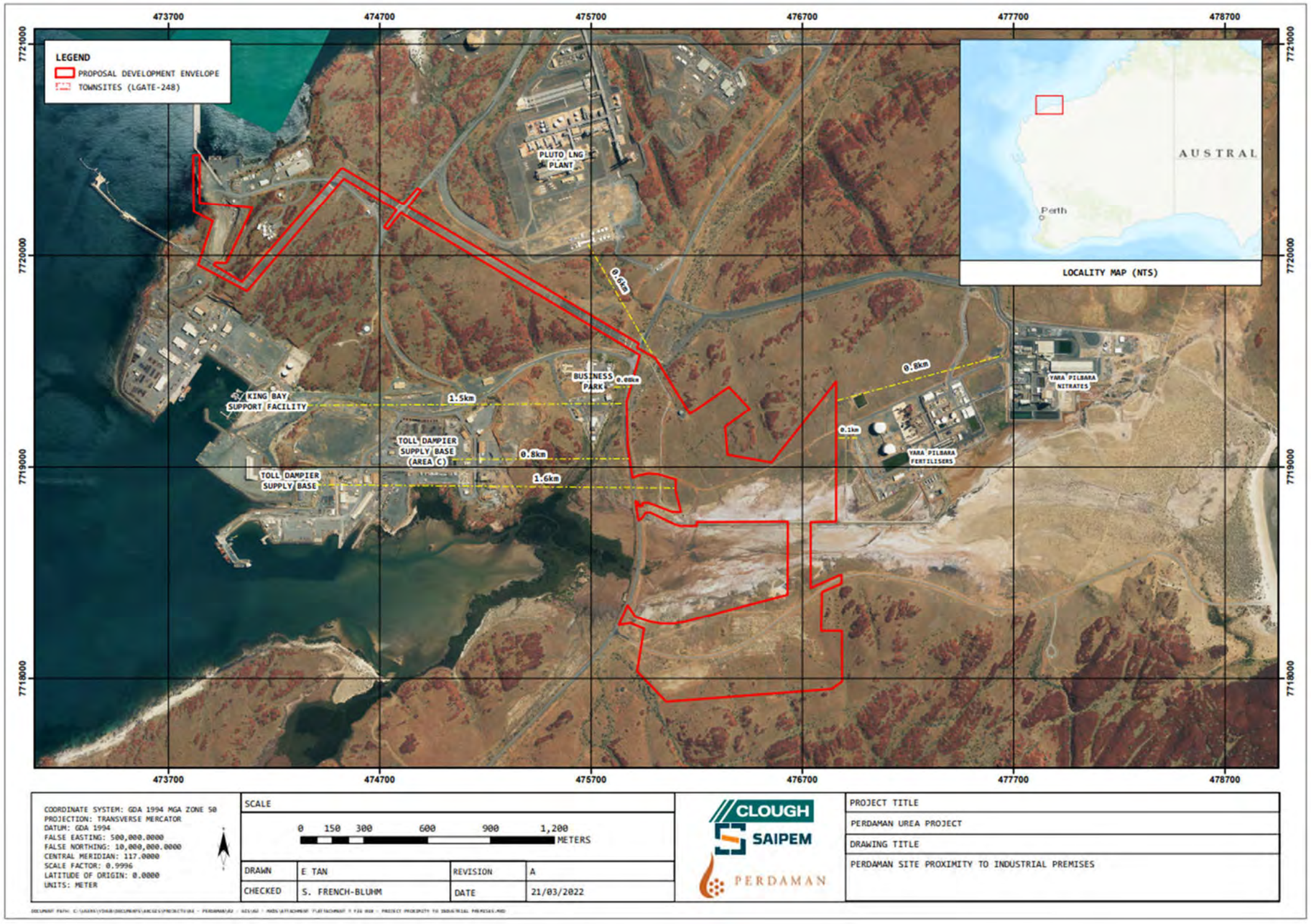
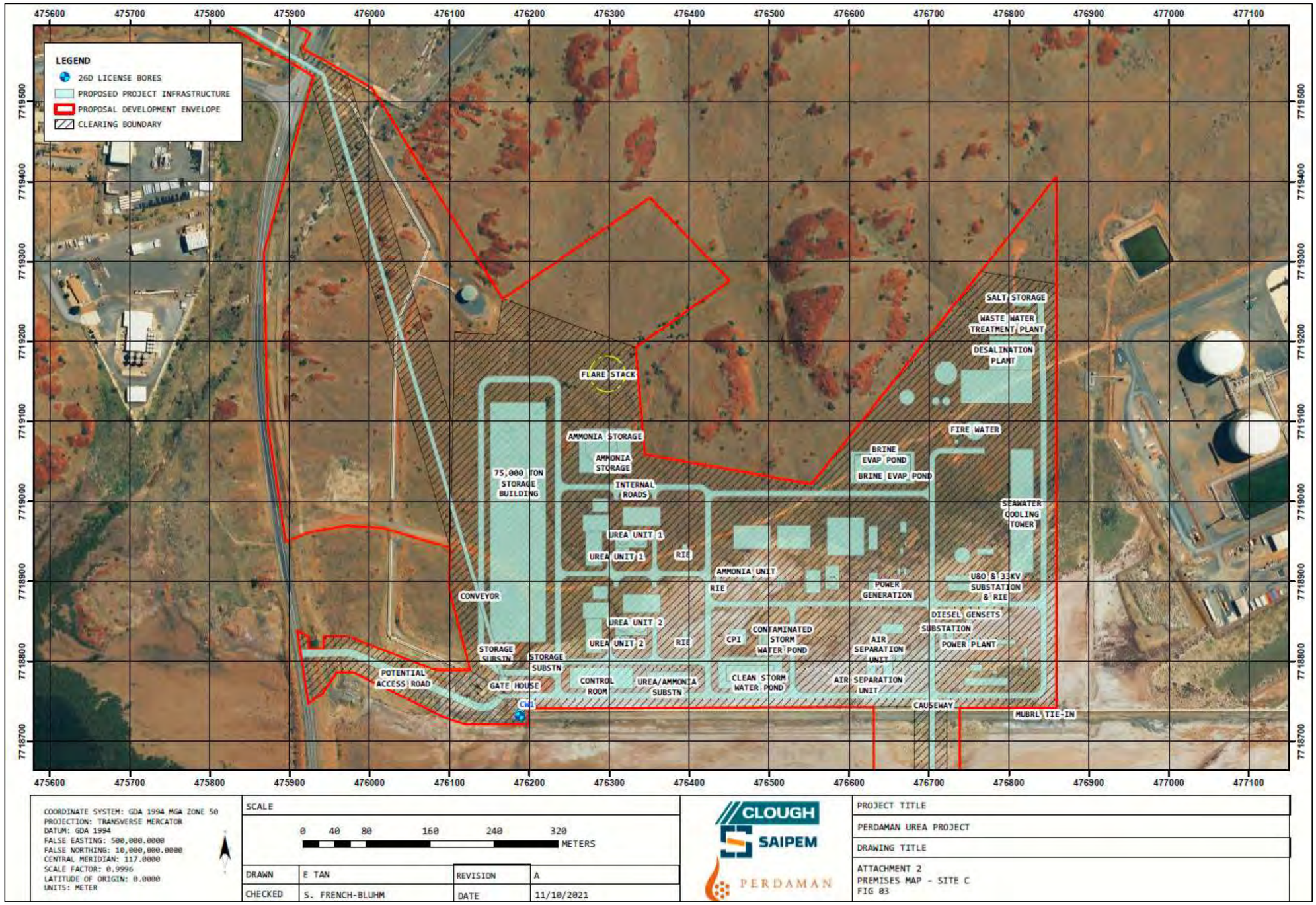


Figure 1: Map of the boundary of the prescribed premises



COORDINATE SYSTEM: GDA 1994 MGA ZONE 50
PROJECTION: TRANSVERSE MERCATOR
DATUM: GDA 1994
FALSE EASTING: 500,000.0000
FALSE NORTHING: 10,000,000.0000
CENTRAL MERIDIAN: 117.0000
SCALE FACTOR: 0.9996
LATITUDE OF ORIGIN: 0.0000
UNITS: METER

SCALE: 0 40 80 160 240 320 METERS

DRAWN	E TAN	REVISION	A
CHECKED	S. FRENCH-BLUHM	DATE	11/10/2021

CLOUGH SAIPEM PERDAMAN

PROJECT TITLE: PERDAMAN UREA PROJECT

DRAWING TITLE: ATTACHMENT 2 PREMISES MAP - SITE C FIG 03

Figure 2: Site C clearing boundary

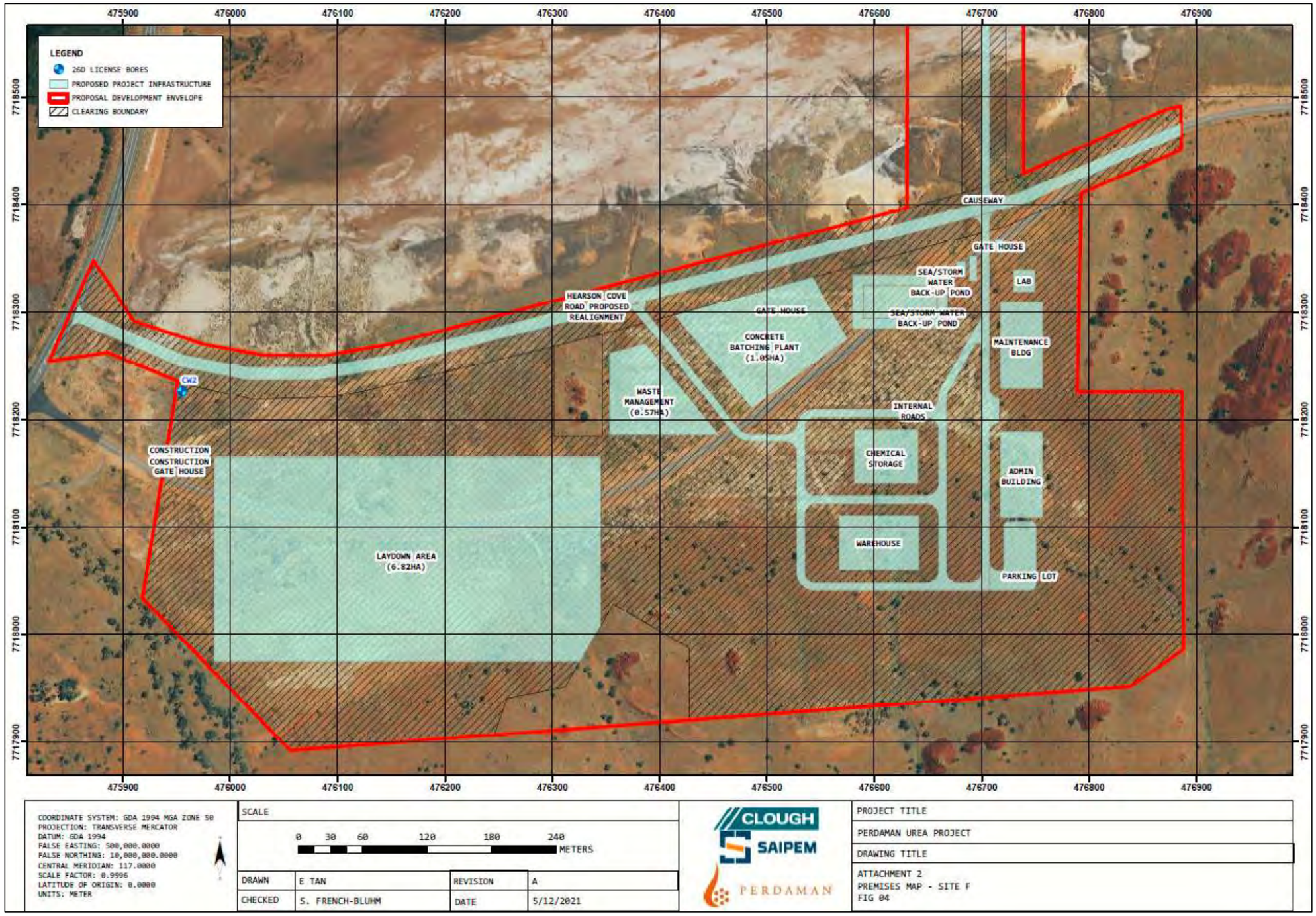


Figure 3: Site F clearing boundary

Figure 4: Site C boundary coordinate references

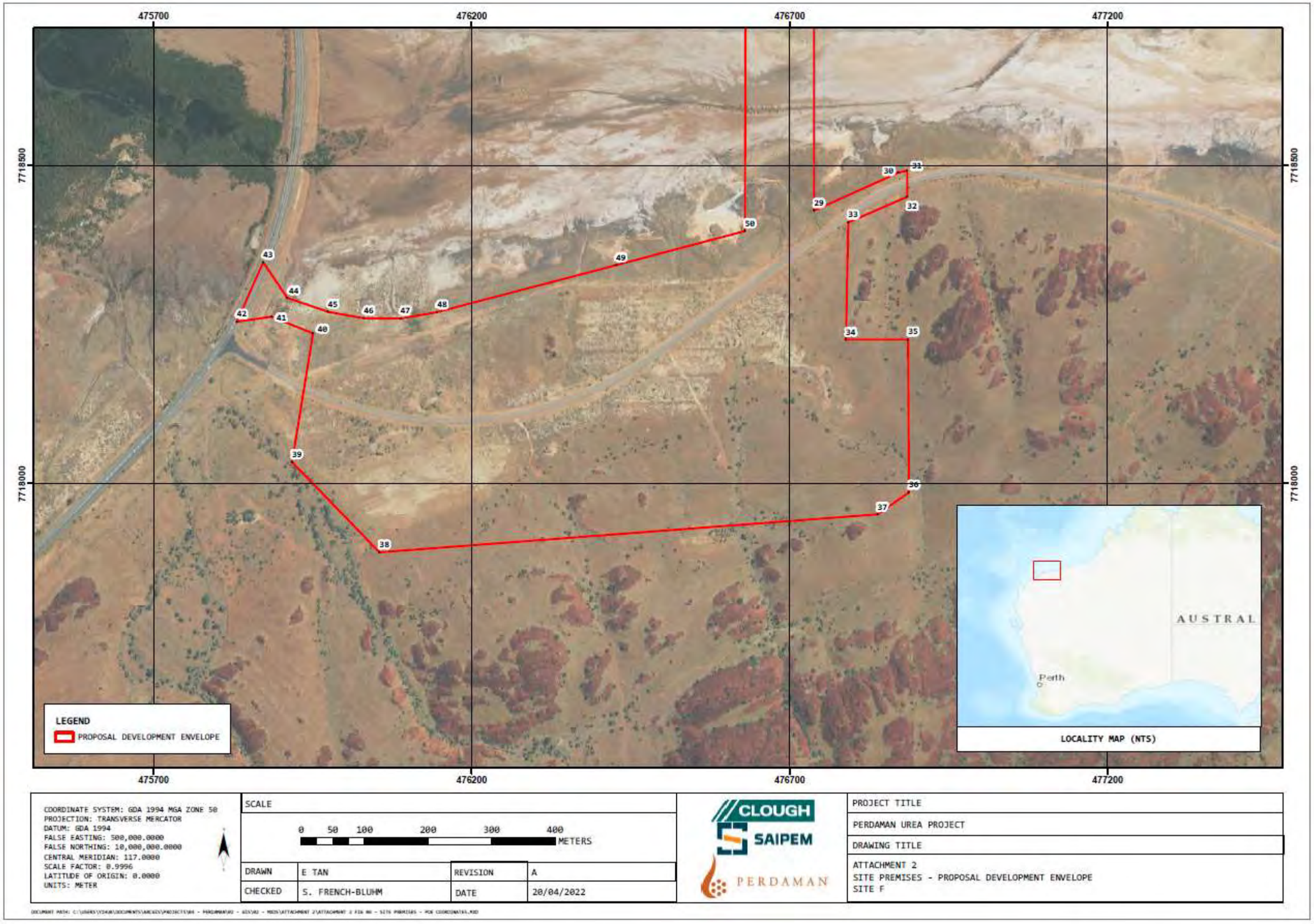


Figure 5: Site F boundary coordinate references

Schedule 2: Premises boundary

The premises boundary is defined by the coordinates in Table 4.

Table 4: Premises boundary coordinates

Site C

Object ID	Eastings	Northings
17	475916.259	7719567.13
18	475985.102	7719528.18
19	476003.607	7719517.31
20	476166.892	7719253.51
21	476351.246	7719380.39
22	476450.896	7719276.29
23	476333.451	7719192.65
24	476344.919	7719059.03
25	476553.03	7719022.75
26	476859.09	7719406.64
27	476859.028	7718742.08
28	476738.322	7718741.95
51	476738.322	7718428.88
52	476871.202	7718488.62
53	476885.005	7718491.66
54	476885.21	7718450.77
55	476792.281	7718410.35
56	476788.64	7718226.04
57	476886.284	7718226.27
58	476887.533	7717985.82
59	476837.882	7717951.3
60	476055.261	7717891.8
61	475923.158	7718831.59
62	475924.118	7718816.05
63	475943.012	7718816.05
64	475943.012	7718831.59
65	475972.519	7718831.59
66	476084.79	7718789
67	476126	7718789
68	476099.386	7718892.72
69	476100.958	7718941.9
70	476016.484	7718967.19
71	475970.742	7718970.11
72	475923.778	7718961.41
73	475895.063	7718949.84
74	475872.724	7719095.56
75	475867.783	7719311.19
76	475929.523	7719531.94

Site F

Object ID	Eastings	Northings
29	476738.322	7718428.88
30	476871.202	7718488.62
31	476885.005	7718491.66
32	476885.21	7718450.77
33	476792.281	7718410.35
34	476788.64	7718226.04
35	476886.284	7718226.27
36	476887.533	7717985.82
37	476837.882	7717951.3
38	476055.261	7717891.8
39	475917.435	7718033.74
40	475950.558	7718235.95
41	475885.216	7718262.14
42	475830.655	7718254.09
43	475872.134	7718347.63
44	475909.732	7718291.88
45	475974.071	7718269.9
46	476030.62	7718259.68
47	476088.084	7718259.42
48	476145.59	7718269.29
49	476426.84	7718343.29
50	476629.885	7718396.72