# GARDEN GULLY PROJECT
# WORKS APPROVAL APPLICATION

## ATTACHMENT 6A
## EMISSIONS & DISCHARGES

PREPARED FOR:

**NEW MURCHISON GOLD LIMITED**

NMG
New Murchison
Gold Limited

DECEMBER 2024

[redacted]

MBS
ENVIRONMENTAL

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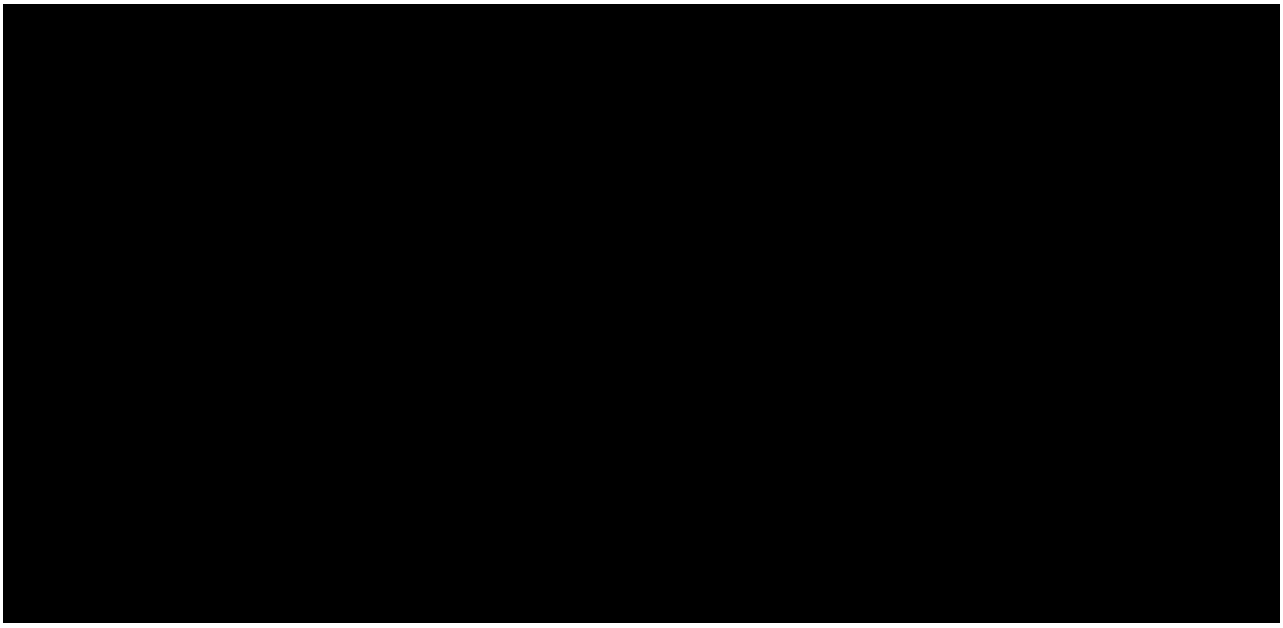
environmental and geoscience consultants

# GARDEN GULLY PROJECT
# ATTACHMENT 6A - WORKS APPROVAL APPLICATION



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# APPENDICES

# 1. RATIONALE

This Attachment 6A document supplements the WAA for the Garden Gully Project, Category 12 and Category 6 activities.

The construction and operation of the Project will result in emissions to air, and discharges to land, as a result of the prescribed activity described in this Works Approval Application (see Attachment 3B). These emissions and discharges are described in detail in the following sections.

The IR-F09 Application Form: Works Approval and Licence, Part 9, advises the use of the Guidance Statement: Risk Assessment (DWER 2020) to determine what information is required to be presented to assist the Government of Western Australia's Department of Water and Environmental Regulation (DWER) in assessing the risks associated with the Prescribed Premises, as detailed in Table 1.

**Table 1: DWER Considerations for Emissions and Discharges from Prescribed Premises**

| Linkage | Information |
|---|---|
| Source | Identify the type, volume, concentration, and duration of the emissions. |
| | Identify the foreseeable operations and expected infrastructure, equipment and operational failures at the Prescribed Premises which may, from time to time, cause higher emission levels or different emissions than those of normal operations (e.g. because of plant start-up or shutdown for maintenance). |
| Pathway | Identify the site location and environmental context such as topography and meteorology. |
| Receptors | Identify environmentally sensitive receptors. |
| | Consider separation and environmental siting factors to determine how emissions or discharges may impact on a receptor. |
| | Receptors exclude employees, visitors or contractors of the licence holder. This is because other state legislation protects them from exposure risks and mandates prevention strategies. |

The emission and/or discharge sources and potentially impacted receptors are described in the following sections with reference to the pathway.

# 2. ENVIRONMENTALLY SENSITIVE RECEPTORS

Construction and operation of the Prescribed Premises has the potential to impact environmentally sensitive receptors. Environmentally sensitive receptors were detailed in Section 2 of Attachment 7 to the WAA, summarised as:

- Ecological communities, flora and fauna:
  - Priority 4 Flora - *Grevillea inconspicua.*
  - Fauna protected under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) - Grey Falcon.
  - Fauna protected under the *Biodiversity Conservation Act 2016* (BC Act) - Peregrine Falcon.
- Water bodies:
  - Garden Gully Creek (M 51/889 and M 51/886).
- Aboriginal and other heritage sites:
  - Local Historic Heritage Site 25188 Garden Gully.
- Nearby communities:
  - Meekatharra township (7 km southwest).
  - Buttah Windee Aboriginal Community (11 km southwest).

Employees, visitors, and contractors are not considered sensitive receptors in relation to the Project, as they are protected from exposure risks, and prevention strategies are mandated by other state legislation.

# 3. CATEGORY 6 - MINE DEWATERING INFRASTRUCTURE

Brackish, slightly alkaline groundwater is required to be removed to allow mineral exploitation to commence in two proposed open pits, West pit and East pit. Water will be removed and transferred by a purpose-built pipeline to the nearby Turkeys Nest for use in dust suppression in the mining area and on the haul road. Surplus dewater is proposed to discharged into two historic pits (Five Mile Well and Sabbath) via two overland pipelines. Abstraction from West and East pit will be in accordance with requirements of a Groundwater License application submitted concurrently with this application.

Air emissions from use of diesel pumps for water abstraction and transfer will be negligible in nature. Given sensitive receptors are more than 5 km from the discharge point, no significant impacts are considered to result from odour emissions.

Noise emissions from the pumping and water transfer are expected to be negligible in nature, given sensitive receptors are more than 5 km from the discharge point. Therefore, no significant impacts are considered to result from noise emissions.

## 3.1 DISCHARGE TO LAND OR SURFACE WATER

### 3.1.1 Sources

A summary of water quality data for Five Mile Well pit indicates that salinity within the pit lake was variable, peaking at 5,600 mg/L Total Dissolved Solids (TDS) in March 2019, before falling again during and immediately following the latest phase of mining to 1,400 mg/L TDS. Arsenic concentrations within Five Mile Well pit were also variable, ranging from 0.007 to 0.14 mg/L with a pH between 8.1 to 9.01. Water samples collected from Sabbath Pit in March and October 2024 had a salinity of 1,300 mg/L TDS, pH 8.8, and an arsenic concentration of 0.009 and 0.012 mg/L. Both pits contained elevated concentrations of arsenic, which is consistent with previous water quality results for the local area. (Appendix 1; Appendix 2).

Emissions to land originating from dewatering of production bores and discharge to Five Mile Well and Sabbath pits is detailed in Table 2. This is based on the water quality results of October 2024. Pit volumes are based off a water balance prepared by NMG, indicating that the two pits should be capable of storing water for approximately 700 days of mining, without considering seepage losses which would increase the storage capacity

**Table 2: Water Discharge Emissions to Five Mile Well and Sabbath Pit**

| Pit | Emission | Volume ($m^3$) | Emissions (mg/L) | Total Emission Volume (kg) |
|---|---|---|---|---|
| Five Mile Well | TDS | 1,200,000 | 1,800 | 2,160,000 |
| | Arsenic | | 0.128 | 153.60 |
| Sabbath | TDS | 514,000 | 1,800 | 925,200 |
| | Arsenic | | 0.128 | 65.28 |

### 3.1.2 Potential Impacts

Project activities have the potential to:

- Contaminate surface water and land due to spillages of groundwater.
- Cause localised erosion channels, sedimentation of watercourses and alteration of drainage lines through inappropriately engineered surface water management structures.
- Contaminate land and affect livestock health if water is not appropriately managed.

### 3.1.3 Receptors

The dewatering infrastructure is located away from most sensitive receptors.

The nearest sensitive receptors are:

- Meekatharra township (7 km southwest).
- Buttah Windee Aboriginal Community (11 km southwest).
- Garden Gully Creek (M 51/889 and M 51/886).

### 3.1.4 Control Measures

- Both discharge points will be fenced to prevent fauna access.
- Pipeline is contained within an earthen bund.
- Pipeline fitted with leak detection instrumentation and flow meters.
- Scour pits, each of 320 $m^3$ capacity will be constructed along both Five Mile Well and Sabbath pit pipelines at isolation points to allow direction of spills to areas where it could be recovered for collection in the advent of pipe failure or leaks.
- Pits will be managed with adequate freeboard to ensure containment of a 1 in 100 year rainfall event over 72 hours.
- Discharge to pits will be in a manner which does not cause erosion and scouring impacts and avoids pit edges.

### 3.1.5 Predicted Environmental Risk

Given the reasonably remote location of the dewatering infrastructure and separation from most sensitive receptors, the proposed mitigation and management measures are sufficient to achieve a low risk of significant impact to local land and surface water quality.

# 4. MOBILE CRUSHING AND SAMPLING PLANT

The mobile crushing and sampling plant has the potential to generate emissions to air as a result of the use of a combustion engine and through dust generated during crushing and sampling operations, together with the emission of noise. Additionally, there is a risk that meteorological events may result in the erosion of stockpiled materials, resulting in land contamination.

Emission source locations are presented in Figure 3 and Figure 4 of Attachment 2 to this Works Approval Application.

## 4.1 EMISSIONS TO AIR

### 4.1.1 Sources

#### *4.1.1.1 Dust Emissions*

Processing of ore in arid environments involves a significant potential for generation of dust emissions. Dust emissions generated during construction and operation of the mobile crushing and sampling plant have the potential to impact environmentally sensitive receptors by impacting air quality. Sources of dust emissions relating to the Prescribed Premises include:

- Land clearing and construction/ earthwork activities.
- Wind erosion from the ROM pad and ore stockpiles.
- Ore crushing and sampling.
- Material handling activities.

Run-of-mine (ROM) ore would be stockpiled and subsequently crushed prior to transport off-site, potentially generating fugitive dust emissions. Crushing and sampling activities would also produce fugitive dust, and the crushing unit does not have any point source emission from equipment such as stacks or baghouses.

#### *4.1.1.2 Combustion Emissions*

The crushing unit is fitted with diesel combustion engines that will generate gaseous emissions.

#### *4.1.1.3 Noise Emissions*

Operation of the Prescribed Premises comprises physical crushing, sampling and sorting or ore where noise emissions would be generated. The crushing unit has two main point-source noise emissions being the primary crusher and secondary crusher. All other noise sources are considered to disperse. Sources of noise emission associated with the Prescribed Premises include:

- Construction and earthwork activities.
- Transport of ore from the open pit to the ROM Pad and feed into the crushing unit using mobile earthwork equipment.
- Crushing of ore using a mobile jaw and cone crusher.
- Operational activities including pumps, diesel generators, conveyors and ore processing equipment.
- Warning alarms on the processing plant and reversing sirens on mobile machinery and equipment.

## 4.1.2 Potential Impacts

### *4.1.2.1 Dust Emissions*

The potential impacts from dust particulates as a result of the Prescribed Premises include:

- Decrease in vegetation health and condition in adjacent areas due to dust covering vegetation, blocking stomata and reducing the plant's ability to photosynthesise.
- Decrease in fauna health and condition in adjacent areas due to dust covering habitat and potential food sources.
- Decrease in human health of nearby communities due to reduced air quality from dust particulates.
- Poor aesthetics within and outside the project area.

The proposed emissions are typical of many similar mine operations in Western Australia (WA). Dust emissions produced from the Prescribed Premises are not considered significant and are unlikely to impact the surrounding environment or other sensitive receptors.

### *4.1.2.2 Combustion Emissions*

The potential impacts from gaseous emissions as a result of the Prescribed Premises include:

- Reduction in local air quality from mobile equipment emissions including particulates, carbon monoxide, carbon dioxide, sulfur dioxide and nitrous oxides (greenhouse gas emissions).
- Decrease in human health of nearby communities due to reduced air quality from gaseous emissions.

The proposed emissions are typical of many similar mine operations in WA. Gaseous emissions produced from the Prescribed Premises are not considered significant and are unlikely to impact the surrounding environment or other sensitive receptors.

### *4.1.2.3 Noise Emissions*

Potential environmental impacts from noise emissions as a result of the Prescribed Premises include:

- A decrease in fauna health and well-being due to increased nuisance from localised noise volumes.
- Displacement of fauna from their natural habitats and/or changes in behaviour.
- A decrease in human health and well-being of nearby communities due to increased nuisance from localised noise volumes.
- Reduced amenity within and outside of the Project area.

The proposed emissions are typical of many similar mine operations in WA. Noise emissions produced from the Prescribed Premises are not considered significant and are unlikely to impact the surrounding environment or other sensitive receptors.

## 4.1.3 Receptors

The crushing and sampling plant is located away from any sensitive receptors and is contained with the M 51/886 tenement.

The nearest sensitive receptors are the nearby communities:

- Meekatharra township (7 km southwest).
- Buttah Windee Aboriginal Community (11 km southwest).
- Great Northern Highway (approximately 10 km northeast to southwest).

### 4.1.4 Control Measures

#### *4.1.4.1 Dust*

- Dust will be managed and minimised by watering exposed areas from a water cart or with fixed sprays on plant as required.
- During high winds, mobile crushing and sampling activities would be restricted if risk-based assessment measures determine that dust cannot be adequately controlled.
- Bulk dry products would be transported in covered containers to minimise dust off-take.
- The crushing unit would be fitted with water sprays for the minimisation of dust generation.

#### *4.1.4.2 Noise*

- The crushing circuit would be maintained in accordance with original equipment manufacturers (OEMs) requirements to minimise nuisance noise and be compliant with relevant Australian Standard noise criteria.

### 4.1.5 Predicted Environmental Risk

Given the reasonably remote location of the crushing and sampling plant and separation from sensitive receptors, the proposed mitigation and management measures are sufficient to achieve a low risk of significant impact to air quality.

## 4.2 EMISSIONS TO LAND AND SURFACE WATER

### 4.2.1 Sources

The sources of discharges to land and surface water associated with the Prescribed Premises may potentially originate from:

- Deposition of windblown ore to land.
- Hydrocarbon spills or leaks from diesel generators, machinery or vehicles.
- Spillage, leakage or seepage of hydrocarbons used and stored on site.

### 4.2.2 Potential Impacts

Potential impacts from stockpile erosion as a result of the Prescribed Premises include:

- Deposition of sediment in the surrounding environment from uncontrolled runoff during construction activities.
- Sedimentation of local drainage channels and vegetated areas.
- Contamination of surface water and land due to spillages or leaks of hydrocarbons.

### 4.2.3 Receptors

The crushing and sampling plant is located away from any sensitive receptors and is contained within the M 51/886 tenement.

The nearest sensitive receptors are:

- Garden Gully Creek (M 51/889 and M 51/886) (approximately 1 km north).
- Localised ephemeral drainage channels and vegetated areas (within 1 km).

### 4.2.4 Control Measures

- Drainage infrastructure and/or surface water diversions would be constructed to ensure natural flow paths are maintained where possible.
- Mobile crushing and sampling operation stockpiles would be located away or protected from stormwater flows, minimising potential losses via erosion and sedimentation.
- Adaptive management of physical mitigation measures such as bunding, diversion drains, cut-off drains and sediment basins will be considered during construction and operations.
- Appropriate consideration of rainfall and runoff through the project design process to mitigate potential effects of flow concentration and point discharge and include appropriate erosion protection measures as appropriate.

### 4.2.5 Predicted Environmental Risk

Given the reasonably remote location of the crushing and sampling plant and separation from sensitive receptors, the proposed mitigation and management measures are sufficient to achieve a low risk of significant impact to local land and surface water quality.

# 5. OVERALL PREDICTED RESIDUAL ENVIRONMENTAL RISK

Based on the potential impacts and pollution control measures planned to be implemented to manage air emissions, noise emissions, discharges to water and land, the proposed dewatering infrastructure and crushing and sampling plant is considered to present a low risk of pollution to sensitive environmental receptors.

The linkage from the source of emissions, via pathways towards receptors to determine whether a residual environmental impact will occur, is described in Table 3. Residual risk has been determined in accordance with the risk criteria and risk matrix outlined in DWER's Risk Assessment Guideline (DWER 2020).

# 6. RISK ASSESSMENT

**Table 3: Emissions and Discharges, Pathways, Receptors, and Risks of Prescribed Premises**

| Source/Activity | Potential Emission/Discharge | Potential Pathway | Potential Receptors | Assessment of Potential Impact | Residual Risk Rating once Controls in Place |
|---|---|---|---|---|---|
| General construction of Prescribed Premises | • Dust from land clearing activities.<br>• Noise from construction of Prescribed Premises.<br>• Deposition of sediment in the surrounding environment from uncontrolled runoff. | • Air<br>• Surface water<br>• Land | • Priority Flora.<br>• Garden Gully Creek.<br>• Significant fauna.<br>• Registered Heritage Sites.<br>• Meekatharra township (7 km southwest).<br>• Buttah Windee Aboriginal Community (11 km southwest). | Dust affecting flora, significant fauna habitat, Garden Gully Creek and heritage sites would be controlled at the source through the implementation of mitigation measures, including water sprays minimising the area of disturbance.<br><br>Nearby communities are greater than 5 km away and comprises intermittent or low number of visitors/residents.<br><br>The proposed emissions are typical of many similar mine operations in WA. Dust and noise emissions produced from the Prescribed Premises are not considered significant and are unlikely to impact the surrounding environment or other sensitive receptors.<br><br>Planned control measures would mitigate potential impact. Sediment emissions are not considered significant and are unlikely to impact the surrounding environmental or other sensitive receptors. | Low |
| Mine Dewatering Infrastructure | • Discharge to land or surface water | • Surface water<br>• Land | • Priority Flora.<br>• Significant Fauna.<br>• Garden Gully Creek.<br>• Registered Heritage Sites. | Contamination affecting flora, significant fauna habitat, Garden Gully Creek and heritage sites will be controlled through the implementation of mitigation measures, including the creation of scour pits, bunding and leak detectors along pipelines. | Low |

| Source/Activity | Potential Emission/Discharge | Potential Pathway | Potential Receptors | Assessment of Potential Impact | Residual Risk Rating once Controls in Place |
|---|---|---|---|---|---|
| Mobile Crushing and Sampling plant | • Dust from crushing and sampling | • Air | • Priority Flora.<br>• Significant Fauna.<br>• Garden Gully Creek.<br>• Registered Heritage Sites.<br>• Meekatharra township (7 km southwest).<br>• Buttah Windee Aboriginal Community (11 km southwest). | Dust affecting flora, Garden Gully Creek and heritage sites would be controlled at the source through the implementation of mitigation measures, including water sprays minimising the area of disturbance.<br><br>Nearby communities are greater than 5 km away and comprises intermittent or low number of visitors/residents.<br>The proposed emissions are typical of many similar mine operations in WA. Dust emissions produced from the Prescribed Premises are not considered significant and are unlikely to impact the surrounding environment or other sensitive receptors. | Low |
| | • Gaseous emissions from diesel combustion | • Air | • Priority Flora.<br>• Significant Fauna.<br>• Garden Gully Creek.<br>• Registered Heritage Sites.<br>• Meekatharra township (7 km southwest).<br>• Buttah Windee Aboriginal Community (11 km southwest). | The proposed emissions are typical of many similar mine operations in WA. Gaseous emissions produced from the Prescribed Premises are not considered significant and are unlikely to impact the surrounding environment or other sensitive receptors. | Low |
| | • Noise from crushing and sampling | • Air | • Significant Fauna.<br>• Garden Gully Creek.<br>• Registered Heritage Sites.<br>• Meekatharra township (7 km southwest).<br>• Buttah Windee Aboriginal Community (11 km southwest). | Possible significant fauna habitat occurs at the Project, however, vegetation is well represented outside the Prescribed Premise Boundary and therefore unlikely to impact significant fauna<br><br>Nearby communities are greater than 5 km away and comprises intermittent or low number of visitors/residents. Generated noise is unlikely to be audible at the nearest permanent community (7 km) but will depend on wind direction. | Low |

| Source/Activity | Potential Emission/Discharge | Potential Pathway | Potential Receptors | Assessment of Potential Impact | Residual Risk Rating once Controls in Place |
|---|---|---|---|---|---|
| | • Contamination from hydrocarbon spills | • Surface water<br>• Land | • Priority Flora.<br>• Significant Fauna.<br>• Garden Gully Creek.<br>• Registered Heritage Sites.<br>• Meekatharra township (7 km southwest).<br>• Buttah Windee Aboriginal Community (11 km southwest). | Spillages likely to be very small in volume given equipment storage capacities, resulting in localised clean-up and no material environmental impact.<br><br>Given the reasonably remote location of the crushing and sampling plant and separation from sensitive receptors, the proposed mitigation and management measures are sufficient to achieve a low risk of significant impact to local land and surface water quality. | Low |
| | • Sedimentation of local drainage channels and vegetated areas. | • Surface water<br>• Land | • Priority Flora.<br>• Significant Fauna.<br>• Garden Gully Creek.<br>• Registered Heritage Sites. | Mobile crushing and sampling operations would be undertaken away from identified priority flora populations, and there are no nearby surface water receptors.<br><br>Any erosion of the stockpiles is likely to be isolated to the immediate stockpile/sampling area, and surface water flows would be directed to a diversion drain for collection. | Low |

# 7. REFERENCES

Department of Water and Environmental Regulation (DWER). 2020. *Guideline: Risk Assessments*. Government of Western Australia. Joondalup, Perth. December 2020

Rockwater. 2024. *Garden Gully Project - Hydrological and Hydrogeological Assessment*. Report for Ora Gold Pty Ltd. March 2024.

# APPENDICES

# APPENDIX 1: WATER QUALITY LABORATORY RESULTS

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EP2413125** | Page | : 1 of 5 |
| Client | : ROCKWATER PTY LTD | | |
| Contact | [redacted] | | [redacted] |
| Address | | | |
| Telephone | : | | |
| Project | : Garden Gully Dewatering Study | Date Samples Received | : 11-Sep-2024 12:30 |
| Order number | : ---- | Date Analysis Commenced | : 12-Sep-2024 |
| C-O-C number | : ---- | Issue Date | : 19-Sep-2024 15:17 |
| Sampler | [redacted] | | |
| Site | : | | |
| Quote number | : EP23ROCWAT0002_V3 | | |
| No. of samples received | : 1 | | |
| No. of samples analysed | : 1 | | |

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* |
|---|---|---|
| [redacted] | | |

## 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 Contract 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.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- 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.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | Sample ID | Crown Prince (Bore CP) | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Sampling date / time | 08-Sep-2024 00:00 | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EP2413125-001 | -------- | -------- | -------- | -------- |
| | | | | Result | --- | --- | --- | --- |
| **EA005P: pH by PC Titrator** | | | | | | | | |
| pH Value | ---- | 0.01 | pH Unit | **7.77** | ---- | ---- | ---- | ---- |
| **EA010P: Conductivity by PC Titrator** | | | | | | | | |
| Electrical Conductivity @ 25°C | ---- | 1 | µS/cm | **2730** | ---- | ---- | ---- | ---- |
| **EA015: Total Dissolved Solids dried at 180 ± 5 °C** | | | | | | | | |
| Total Dissolved Solids @180°C | ---- | 10 | mg/L | **1620** | ---- | ---- | ---- | ---- |
| **EA065: Total Hardness as CaCO3** | | | | | | | | |
| Total Hardness as CaCO3 | ---- | 1 | mg/L | **680** | ---- | ---- | ---- | ---- |
| **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 | **399** | ---- | ---- | ---- | ---- |
| Total Alkalinity as CaCO3 | ---- | 1 | mg/L | **399** | ---- | ---- | ---- | ---- |
| **ED041G: Sulfate (Turbidimetric) as SO4 2- by DA** | | | | | | | | |
| Sulfate as SO4 - Turbidimetric | 14808-79-8 | 1 | mg/L | **189** | ---- | ---- | ---- | ---- |
| **ED045G: Chloride by Discrete Analyser** | | | | | | | | |
| Chloride | 16887-00-6 | 1 | mg/L | **647** | ---- | ---- | ---- | ---- |
| **ED093F: Dissolved Major Cations** | | | | | | | | |
| Calcium | 7440-70-2 | 1 | mg/L | **104** | ---- | ---- | ---- | ---- |
| Magnesium | 7439-95-4 | 1 | mg/L | **102** | ---- | ---- | ---- | ---- |
| Sodium | 7440-23-5 | 1 | mg/L | **380** | ---- | ---- | ---- | ---- |
| Potassium | 7440-09-7 | 1 | mg/L | **29** | ---- | ---- | ---- | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | ---- | ---- | ---- | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | **0.128** | ---- | ---- | ---- | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | ---- | ---- | ---- | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | ---- | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | Crown Prince (Bore CP) | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 08-Sep-2024 00:00 | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EP2413125-001 | -------- | -------- | -------- | -------- |
| | | | | | Result | --- | --- | --- | --- |
| **EG020F: Dissolved Metals by ICP-MS - Continued** | | | | | | | | | |
| Manganese | 7439-96-5 | 0.001 | mg/L | | **0.050** | ---- | ---- | ---- | ---- |
| Selenium | 7782-49-2 | 0.01 | mg/L | | <0.01 | ---- | ---- | ---- | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | | **0.012** | ---- | ---- | ---- | ---- |
| Iron | 7439-89-6 | 0.05 | mg/L | | <0.05 | ---- | ---- | ---- | ---- |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| Mercury | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | ---- | ---- | ---- | ---- |
| **EG052G: Silica by Discrete Analyser** | | | | | | | | | |
| Reactive Silica | ---- | 0.05 | mg/L | | **55.2** | ---- | ---- | ---- | ---- |
| **EK055G: Ammonia as N by Discrete Analyser** | | | | | | | | | |
| Ammonia as N | 7664-41-7 | 0.01 | mg/L | | <0.01 | ---- | ---- | ---- | ---- |
| **EK057G: Nitrite as N by Discrete Analyser** | | | | | | | | | |
| Nitrite as N | 14797-65-0 | 0.01 | mg/L | | <0.01 | ---- | ---- | ---- | ---- |
| **EK058G: Nitrate as N by Discrete Analyser** | | | | | | | | | |
| Nitrate as N | 14797-55-8 | 0.01 | mg/L | | **1.83** | ---- | ---- | ---- | ---- |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser** | | | | | | | | | |
| Nitrite + Nitrate as N | ---- | 0.01 | mg/L | | **1.83** | ---- | ---- | ---- | ---- |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser** | | | | | | | | | |
| Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | | **0.3** | ---- | ---- | ---- | ---- |
| **EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser** | | | | | | | | | |
| ^ Total Nitrogen as N | ---- | 0.1 | mg/L | | **2.1** | ---- | ---- | ---- | ---- |
| **EK067G: Total Phosphorus as P by Discrete Analyser** | | | | | | | | | |
| Total Phosphorus as P | ---- | 0.01 | mg/L | | **0.04** | ---- | ---- | ---- | ---- |
| **EK071G: Reactive Phosphorus as P by discrete analyser** | | | | | | | | | |
| Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | | **0.03** | ---- | ---- | ---- | ---- |
| **EN055: Ionic Balance** | | | | | | | | | |
| ø Total Anions | ---- | 0.01 | meq/L | | **30.2** | ---- | ---- | ---- | ---- |
| ø Total Cations | ---- | 0.01 | meq/L | | **30.8** | ---- | ---- | ---- | ---- |
| ø Ionic Balance | ---- | 0.01 | % | | **1.14** | ---- | ---- | ---- | ---- |

# APPENDIX 2: SABBATH AND FIVE MILE WELL PIT HISTORICAL WATER QUALITY RESULTS

## Appendix 1B: Sabbath and Five Mile Well Pit Historical Water Quality Results

| Units | ANZECC Trigger Value | Lab Id | Five Mile Well Pit | | | | | | | | | Sabbath Pit | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 10/04/2001 | 10/04/2002 | 30/05/2013 | 20/07/2017 | 22/05/2018 | 13/03/2019 | 4/05/2020 | 2/03/2024 | 24/10/2024 | 2/03/2024 | 24/10/2024 |
| **pH Units** | | **pH** | 8.6 | 8.6 | 8.8 | 8.9 | 8.75 | 8.74 | 8.3 | 8.8 | | 8.8 | |
| **mg/L** | **5** | **Al** | | | | 0.02 | | 0.01 | 0.005 | 0.005 | 0.01 | 0.005 | 0.01 |
| **mg/L** | **0.5** | **As** | 0.1 | 0.11 | 0.12 | 0.13 | | 0.14 | 0.06 | 0.077 | 0.007 | 0.012 | 0.009 |
| **mg/L** | **0.01** | **Cd** | 0.005 | 0.005 | 0.001 | 0.0005 | | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| **mg/L** | | **Cl** | 690 | 770 | 1900 | 1900 | | 2600 | 410 | 550 | | 380 | |
| **mg/L** | **1** | **Cu** | 0.05 | 0.05 | 0.005 | 0.005 | | 0.002 | 0.001 | 0.001 | | 0.001 | |
| **mg/L** | | **Fe** | 0.05 | 0.05 | 0.02 | 0.025 | | 0.01 | 0.005 | 0.007 | 0.05 | 0.016 | 0.06 |
| **mg/L** | | **Mg** | 110 | 110 | 230 | 320 | | 330 | 73 | 90 | | 61 | |
| **mg/L** | | **Mn** | | | 0.005 | 0.005 | | 0.002 | 0.006 | 0.001 | 0.003 | 0.001 | 0.001 |
| **mg/L** | | **Na** | 530 | 560 | 1300 | 1500 | | 1500 | 330 | 400 | | | |
| **mg/L** | **1** | **Ni** | 0.05 | 0.05 | 0.01 | 0.005 | | 0.002 | 0.001 | 0.001 | | 0.01 | |
| **mg/L** | **0.02** | **Se** | 0.01 | 0.01 | | 0.006 | | 0.004 | 0.006 | 0.005 | 0.01 | 0.003 | |
| **mg/L** | **4000** | **TDS** | 2200 | 2600 | 4700 | 5600 | | | 1400 | 1700 | | 1300 | |
| **mg/L** | | **Pb** | 0.05 | 0.05 | 0.02 | 0.005 | | 0.002 | 0.001 | 0.001 | 0.001 | 0.001 | |
| **mg/L** | **20** | **Zn** | 0.05 | 0.05 | 0.01 | 0.025 | | 0.018 | 0.005 | 0.005 | 0.006 | 0.05 | 0.021 |