Licence number	L6465/1989/10
Licence holder	Alcoa of Australia Limited
ACN	004 879 298
Registered business address	181-205 Davy Street BOORAGOON WA 6154
DWER file number	DWERVT15844
Duration	05/10/2015 to 04/10/2031
Date of issue	01/10/2015
Date of amendment	28/10/2024
Premises details	Willowdale Mine Part of Mineral Lease 1SA Willowdale Rd (via Wagerup Refinery Access Rd) WAROONA WA 6215 As defined by the maps in Schedule 1

Prescribed premises category description (Schedule 1, *Environmental Protection Regulations 1987*)	**Assessed production capacity**
Category 05: Processing or beneficiation of metallic or non-metallic ore	16,000,000 tonnes per annual period

This amended licence is granted to the licence holder, subject to the attached conditions, on 28 October 2024, by:

Christine Pustkuchen
Digitally signed by Christine Pustkuchen
Date: 2024.10.28 11:24:46 +08'00'

MANAGER, RESOURCES INDUSTRIES
INDUSTRY REGULATION (STATEWIDE DELIVERY)

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Licence history

Date	Reference number	Summary of changes
01/10/2000	L6465/1989/1	Licence granted.
11/10/2001	L6465/1989/2	Renewed for one year.
1/10/2002	L6465/1989/3	Renewed for one year.
18/9/2003	L6465/1989/4	Renewed for one year.
5/10/2004	L6465/1989/5	Renewed for one year.
5/10/2005	L6465/1989/6	Renewed for five years.
5/10/2010	L6465/1989/9	Renewed for five years.
5/10/2015	L6465/1989/10	Renewed for five years.
05/05/2020	L6465/1989/10	Licence amendment to extend the premises boundary and authorise relocation of a rock crusher from the Orion mine region to the Larego mine region. New overland ore conveyor from Larego to Arundel, and new wastewater treatment and storage infrastructure.
30/11/2021	L6465/1989/10	Licence amendment to extend the timeframe for completion of infrastructure associated with mining moving to Larego area.
20/02/2024	L6465/1989/10	Licence amendment for construction and operation of a PFAS water treatment plant at Arundel mining area, upgrades to stormwater management at Arundel (new stormwater dams, oil-water separator and pipelined). Review of noise emissions from crushing infrastructure associated with move to Larego mining region.
28/10/2024	L6465/1989/10	Licence amendment to authorise a number of minor changes including but not limited to: ▪ Inclusion of a 5,000 L underground concrete waste holding pit to capture potentially impacted hydrocarbon wastewater from the Arundel workshop; ▪ Change to the McKnoes Brook water level monitoring device location, construction and monitoring requirements; and ▪ Change to the freeboard requirements at Orion Sumps 1 and 2.

Interpretation

In this licence:

(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 licence:

  (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 licence requires specific conditions to be met but does not provide any implied authorisation for other emissions, discharges, or activities not specified in this licence.

Licence conditions

The licence holder must ensure that the following conditions are complied with:

1. The licence holder must construct and/or install the infrastructure listed in Table 1, in accordance with;

(a) the corresponding design and construction requirement / installation requirement; and

(b) at the corresponding infrastructure location; and

(c) within the corresponding timeframe,

as set out in Table 1.

Table 1: Design and construction requirements / installation requirements

Infrastructure	Design and construction / installation requirement	Infrastructure location	Timeframe
PFAS Treatment Unit (PTU)	• Capacity to treat 40 m^3 per hour PFAS contaminated water; • Granular Activated Carbon / Ion Exchange resin treatment technology; • Treatment levels designed to meet limit of reporting for ultratrace analysis of PFAS (as listed in condition 20, Table 10); • To be built in a concrete bunded area to contain leaks/spills, any overflow to be directed back to PT-001 or PT-002; • Tanks to have high level alarms and float switches to prevent system overflows. The units will be managed via the plants Programmable logic controller (PLC) and alert operations; and • Constructed as per layout shown in Figure 3 of Schedule 1.	Arundel mining area as shown in Figure 2 of Schedule 1 and Arundel infrastructure and equipment as shown in Figure 8 in Schedule 1: Arundel site layout and drainage plan.	N/A
Arundel Workshop and stormwater collection pond (ASW3)	Arundel Workshop: • 5,000 L underground concrete waste holding pit. Arundel Stormwater collection pond (ASW3): • Storage capacity of 1.5 ML; and • Clay liner and HDPE liner to meet maximum permeability of 1 x 10^{-9} m/s.		
Pipelines from Arundel mining area to PTU, and from PTU to McKnoes Brook discharge	• Pipelines from PTU to McKnoes brook discharge point to have: - Capacity of 72 m^3/hour - 125 mm diameter HDPE pipelines; and - be installed above ground, and		

Infrastructure	Design and construction / installation requirement	Infrastructure location	Timeframe
point	have leak detection systems installed; • Pipelines conveying PFAS-contaminated, or hydrocarbon contaminated water must be double skinned, have leak detection systems installed and be: - Installed above ground; or - Installed within a culvert below ground where pipelines intersect roads or areas require vehicle access. • Pipelines to be laid in existing easements • Flowmeter(s) installed to record volumes treated and discharged • Discharge point to McKnoes Brook to be installed over existing rock dominated channel to control erosion and sedimentation, preventing damage to bed and banks		
Upgrades to Anpress Pre-treatment sump (shotcrete cell) (ASP2)	• Storage Capacity up to 280 kL • Lined to meet maximum permeability of 1 x 10^{-9} m/s • Minimum design freeboard 1 meter (sufficient to cater for a 1:100 year AEP 72 hr rainfall event)	Arundel infrastructure and equipment as shown in Figure 8 of Schedule 1: Arundle site layout and drainage plan	
Anpress Pre-treatment sump (ASP3)	• Storage Capacity up to 1.5 ML • Lined to meet maximum permeability of 1 x 10^{-9} m/s • Minimum design freeboard 1 m (sufficient to cater for a 1:100 year AEP 72 hr rainfall event)		
Noise mitigation infrastructure and works at Arundel	• Installation of 2.5 km enclosure around Conveyor 371 • Sealing of gaps between acoustic panels on the upper floor of the Arundel transfer station.	Conveyor 371 enclosure details as shown in Figure 4 of Schedule 1	31 December 2025
McKnoes Brook water level monitoring device	• Must be capable monitoring instantaneous (daily) water levels to allow streamflow calculations • Streamflow monitoring device / instrumentation to be installed shall be determined in consultation with DWER (Environmental Water Planning and South west regional hydrologists)	Upstream of the McKnoes Brook discharge point	Prior to any discharge from the PTU discharge pipeline to McKnoes Brook
	• Must be capable of monitoring relevant parameters to allow daily streamflow calculations in accordance with the *Water*	• Downstream of the McKnoes Brook discharge point; and • Situated within an	• Prior to decommissioning of the installed upstream water

Infrastructure	Design and construction / installation requirement	Infrastructure location	Timeframe
	Monitoring Standardisation Technical Committee (WMSTC), National Industry Guidelines for hydrometric monitoring Part 1: Primary Measured Data. • Monitoring device must be installed in accordance with manufacture's protocols and comply with the *Water Monitoring Standardisation Technical Committee (WMSTC), National Industry Guidelines for hydrometric monitoring. Part 3: Instrument and Measurement Systems Management*	area confining all flow with stable artificial flow control structure[1]	level monitoring device; and • Before 30 June 2026.

Note 1: In accordance with WMSTC, National Industry Guidelines for hydrometric monitoring: Part 2: Site Establishment and Operations.

2. The licence holder must within 30 days of each item of infrastructure required by condition 1 being constructed:

(a) undertake an audit of their compliance with the requirements of condition 1; and

(b) prepare and submit to the CEO an audit report on that compliance.

3. The report required by condition 2(b), must include as a minimum the following:

(a) certification by a suitably qualified civil engineer 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 licence holder and contains the printed name and position of that person.

Environmental Commissioning

4. Any environmental commissioning activities undertaken for an item of infrastructure specified in Table 2 must only be carried out:

(a) in accordance with the corresponding commissioning requirements; and

(b) for the corresponding authorised commissioning duration.

Table 2: Environmental commissioning requirements

Infrastructure	Commissioning requirements	Authorised commissioning duration
PTU	• Daily inspections of PTU to ensure integrity and freeboards maintained. • Daily inspections to be logged and recorded. • Any spills or leaks from PTU tanks and modules to be directed back to APTD-001 and APTD-002. • An alarm system must be operated to notify the operator of high tank levels with the PTU.	For a period not exceeding 90 calendar days in aggregate.

	• Sampling and analysis of treated water required prior to discharge in accordance with condition 5 to ensure it complies with approved discharge criteria outlined in Table 10.	

5. The licence holder must undertake the monitoring in Table 3 according to the specifications in that table.

Table 3: Monitoring of treated water during commissioning

Monitoring point reference	Process description	Parameter	Unit	Frequency	Averaging period	Method
Arundel Treated Water Ponds 1, 2 and 3 (ATWP-001, ATWP-002 and ATWP-003) sample points (Figure 8)	Discharge from PTU to Arundel Treated Water Ponds 1, 2 and 3(ATWP-001, ATWP-002 and ATWP-003) to McKnoes Brook (During Commissioning only)	Cumulative volume	m^3 and tonnes	Continuous during discharge	Daily	-
		pH[1]	-	Prior to any discharge from Arundel Treated Water ponds 1, 2 or 3 (ATWP-001, ATWP-002 and ATWP-003) to McKnoes Brook	Composite sample[3]	As per condition 21
		Total Dissolved Solids	mg/L			
		Total Suspended Solids				
		Chloride				
		Nitrate				
		Magnesium				
		Sodium				
		Sulfate				
		Surfactants as MBAS				
		Total Nitrogen				
		Total Phosphorus				
		Oil and Grease[2]				
		TRH				
		BTEX				
		PAH				
		Aluminium				
		Arsenic				
		Barium				
		Cadmium				
		Chromium				
		Cobalt				
		Copper				
		Lead				
		Manganese				
		Mercury				
		Molybdenum				
		Nickel				
		Zinc				
		21 PFAS compounds as listed in Table 10	µg/L			

Note 1: In-field non-NATA accredited analysis permitted.

Note 2: to be sampled with USEPA method 5520B

Note 3: Water samples will be automatically collected at the unit discharge to Arundel treated water ponds 1, 2 and 3 (ATWP-001, ATWP-002 and ATWP-003) by an autosampler. A sample is scheduled for every 0.5 ML of treated water to form a composite sample which will be sent for laboratory analysis.

Noise emissions

6. Within 30 days of the noise mitigation infrastructure and works listed in Table 1 being completed, the licence holder must retain the services of a person qualified and experienced in the area of environmental noise assessment and who by their qualifications and experience is eligible to hold membership of the Australian Acoustical Society or the Australian Association of Acoustical Consultants to:

(a) investigate the nature and extent of noise emissions from the Arundel mining area infrastructure, particularly in relation to the noise levels experienced at the nearest noise sensitive receptor (R1) as shown in Figure 5;

(b) assess in accordance with the methodology required in the *Environmental Protection (Noise) Regulations 1997*, the compliance of the noise emissions from the Arundel mining area infrastructure, against the relevant assigned levels specified in those Regulations; and

(c) compile and submit to the licence holder within 60 days of completion of the assessment required under condition 6(b), a report in accordance with condition 7.

7. A report prepared pursuant to condition 6(c) is to include:

(a) a description of the methods used for monitoring and/or modelling of noise emissions from the Arundel mining area infrastructure;

(b) details and the results of the investigation undertaken pursuant to condition 6(a);

(c) details and results of the assessment of the noise emissions from the Arundel mining area infrastructure, against the relevant assigned levels in the *Environmental Protection (Noise) Regulations 1997* undertaken pursuant to condition 6(b); and

(d) an assessment of noise levels against the most recent previous noise assessment.

8. The licence holder must submit to the CEO the report prepared pursuant to condition 6(c) within 14 days of it being finalised.

9. Where an assessment pursuant to condition 6(b) indicates that noise emissions from the Arundel mining area infrastructure do not comply with the relevant assigned levels in the *Environmental Protection (Noise) Regulations 1997*, the license holder must:

(a) within 60 days of receiving an assessment report pursuant to condition 6(c) prepare a plan to ensure the undertaking of the licensed activity will no longer lead to any contravention of the *Environmental Protection (Noise) Regulations 1997*; and

(b) provide to the CEO a copy of the plan prepared pursuant to condition 9(a) within 30 days of its preparation.

Acceptance and throughput restrictions

10. The licence holder must only accept onto the premises waste of a waste type, which does not exceed the corresponding rate at which waste is received, and which meets the corresponding acceptance specification set out in Table 4.

Table 4: Types of waste authorised to be accepted and treated at the premises

Liquid waste type[1]	Waste code	Quantity limit	Specifications
PFAS contaminated waters	M270	219,000 kL per annual period	• Tankered from sumps within the Orion mining area to Arundel mining area and transferred to APTD-001 or APTD-002 for storage prior to being directed to the PTU for treatment. • Tanker route must not traverse the Reservoir Protection Zone for the Samson Brook Catchment.

Note 1: Additional requirements for the acceptance of controlled waste are set out in the *Environmental Protection (Controlled Waste) Regulations 2004*.

11. The licence holder must ensure that the waste types specified in Table 5 are only subjected to the corresponding processes, subject to the corresponding process limits and/or specifications.

Table 5: Waste processing

Waste type	Processes	Process limits and/or specifications
Sludge from PTU[1]	• To be dewatered and analysed for PFAS chemicals listed in Table 10 by a NATA accredited laboratory, prior to disposal. • Dewatered water to be returned to APTD-001 or APTD-002	• Must be stored in impervious, sealed containers prior to being disposed of to an appropriately licensed facility. • Any leachate generated must be returned to APTD-001 or APTD-002.
Sludge from APTD-001 and APTD-002[1]		
Waste zeolite	Removal and temporary storage prior to offsite disposal	
Waste granular activated carbon		
Waste Anionic exchange resin (PFAS-specific, single use)		

Note 1: Sludge must not be mixed, blended and/or diluted in any way for the purpose of disposal on-site.

Infrastructure and equipment

12. The licence holder must ensure that the site infrastructure and equipment listed in Table 6 and located at the corresponding infrastructure location is maintained and operated in accordance with the corresponding operational requirement set out in Table 6.

Table 6: Infrastructure and equipment requirements

Site infrastructure and equipment	Operational requirement	Infrastructure location
Larego 360 Crusher	• Dust suppression to be integrated with the crusher • Spray bars within the tip hopper to be utilised as required, when dust generation occurs during ore transfer into the crusher • Crushing plant area bunded and operated so that any spillage of contaminated water will be directed to humeceptors prior to reporting to the Larego water	Larego mining area as shown in Figure 11 and Figure 12 of Schedule 1.

Site infrastructure and equipment	Operational requirement	Infrastructure location
	storage reservoir	
Larego Water storage reservoir	• Storage capacity of 47 ML • Maintain HDPE liner to prevent water loss via infiltration • Maintain rock pitched emergency spillway above the maximum level • Maintain minimum freeboard of 1 meter.	
Larego Wastewater Storage Ponds (Oily water pond and DAF holding sump)	• HDPE lined Oily water sump capacity of 100 kL and HDPE lined DAF holding feed pond capacity of 2.6 ML • Maintain a floating surface skimmer in the Oily water pond • Three HDPE lined DAF treated water ponds, each with a capacity of 1 ML • Impervious wastewater service area to be maintained and operated so that any spillage is transferred back into the oily water pond	
Larego Dissolved Air Floatation (DAF) Water Treatment	• The design throughput capacity of the DAF shall be maintained at 40 m^3/hr • Maintain pretreatment oily wastewater sumps with sediment traps and hydrocarbon traps, and capability for mounting a belt skimmer allowing removal of free surface hydrocarbons • UV Stabilised polyethylene tank, designed to AS4766, to be maintained and operated to capture the oil from surface skimmer • Wastewater to be treated to the discharge criteria limits stipulated in Condition 20 • Following water quality testing, successful water quality results allow the transfer of treated water to the Flinders C Sump or Larego Water Storage Reservoir.	
Larego Stormwater management	• HumeCeptor hydrodynamic separators (x 2) to be maintained and operated to remove hydrocarbon and sediments entrained in stormwater runoff • Stormwater shall be diverted around and away from the crushing plant, stockpile, washdown and workshops areas by diversion drains • Drainage at the site to be maintained and operated in accordance with AS/NZS 3500.3 • Retention sump maintained and operated to contain runoff from the crushing plant, stockpiles, washdown and workshops areas so that there is zero discharge of contaminated stormwater from the site for a 1 in 100 annual exceedance probability (AEP) storm event over 72 hours.	

Site infrastructure and equipment	Operational requirement	Infrastructure location
Arundel 371/374 transfer station	• A wide arc (spray) water cannon directed into the transfer chute to be utilised as required, when operating conditions generate excessive dust • Low noise idlers maintained and operated while transfer station is operating • Acoustic shielding and noise mitigation controls to be maintained and operated where required to ensure compliance with *Environmental Protection (Noise) Regulations 1987*	Arundel Mining Area as shown in Figure 8, Figure 9 and Figure 10 of Schedule 1
371 and 374 Conveyors	• Conveyors are fitted with covers for dust control • Transfer stations are fitted with water sprays • Acoustic shielding and noise mitigation controls to be maintained and operated where required to ensure compliance with *Environmental Protection (Noise) Regulations 1987*	
Arundel Pre-treatment dams APTD-001 and APTD-002	Each Pre-treatment Dam must be operated to maintain: • APTD-001 with storage capacity of 50 ML and APTD-002 with storage capacity of 60 ML • clay liner and HDPE liner providing less than 1 x 10^{-9} m/s permeability • Total minimum freeboard allowance of 1,000 mm • Visual marker installed along embankment for freeboard monitoring.	
PTU	• Must be operated in accordance with manufacturer's specifications • Drains and sumps to be maintained with sufficient capacity to allow capture of any spills; • Any spills or leaks from PTU tanks and modules to be directed back to APTD-001 or APTD-002 • An alarm system must be operated to notify the operator of high tank levels within the PTU • Tanks will have high level alarms and float switches to prevent system overflows. The units will be managed via the plants PLC and alert operations.	
PTU Treated Water Dams 1, 2 and 3	Each Treated Water Dam must be operated to maintain: • Storage design capacity of 4.5 ML (combined total of 13.5 ML) • Clay liner and also HDPE liner providing less than 1 x 10^{-9} m/s permeability • Total freeboard allowance of 500 mm	
Pipelines	• Pipelines for conveying PFAS-contaminated water must be double skinned and have leak detection systems	

Site infrastructure and equipment	Operational requirement	Infrastructure location
	installed which are to be maintained during operations • Discharge point to McKnoes Brook to be maintained over existing rock dominated channel • Flowmeter(s) to be maintained to enable discharge rates to be recorded	
Orion Sumps 1, 2 and 3	• Orion Sump 3 (OS3) must be maintained and operated with a minimum freeboard of 50% of the sump capacity; • Orion Sump 3 (OS3) HDPE liner must be maintained to prevent water loss via infiltration; • Orion Sumps 1 (OS1) and 2 (OS2) must be maintained and operated in a series to ensure overtopping of the sump embankment does not occur and that all overflows (directed by underground pipes) are contained within OS3.	Orion Mining Area as shown in Figure 7 of Schedule 1

13. The licence holder must:

(a) undertake inspections as detailed in Table 7;

(b) where an inspection has identified that a requirement as detailed in Table 7 is not met, take corrective action within 30 calendar days to mitigate adverse environmental consequences; and

(c) maintain a record of all inspections undertaken.

Table 7: Inspection of infrastructure

Scope of inspection	Inspection requirement	Frequency of inspection	Location
Dams and sumps at Orion, Arundel and Larego	• Visual inspection to confirm there is no risk of overtopping and to ensure compliance with freeboard requirements as specified in Table 6.	Daily	As shown in Figure 7, Figure 8 and Figure 11 of Schedule 1.
Arundel Pre-treatment dams APTD-001 and APTD-002	• Visual inspection to ensure compliance with freeboard requirements specified in Table 6.	Daily	As shown in Figure 8 of Schedule 1.
All pipelines connected to the PTU	• Visual inspection to confirm integrity of pipes and no leaks present.		Not shown.
Larego Water Storage Reservoir	• Visual inspection to confirm capacity is available.		As shown in Figure 11 of Schedule 1.
DAF Water Treatment Facility pipelines and bunding	• Visual inspection to confirm integrity of pipes and containment infrastructure and that no leaks are present.		As shown in Figure 2 of Schedule 1.

Scope of inspection	Inspection requirement	Frequency of inspection	Location
McKnoes Brook discharge point	• Weekly inspection to confirm integrity of discharge point and existing rock dominated channel to confirm no sedimentation, erosion or scouring of bed and banks.	Weekly	As shown in Figure 2 of Schedule 1.

Emissions and discharges

General emissions

14. The licence holder must as soon as practicable recover, or remove and dispose of, spills of environmentally hazardous materials including PFAS-contaminated water, fuel, oil, or other hydrocarbons, whether inside or outside an engineered containment system.

15. The licence holder must ensure that all material used for the recovery, removal, and/or disposal of environmentally hazardous materials is stored in an impermeable container prior to disposal at an appropriately authorised facility.

16. The licence holder must install and maintain diversion drains and bunds to minimize the volume of stormwater runoff from entering operational areas with potentially contaminated or contaminated stormwater being captured and prevented from being released into the environment.

Dust emissions

17. The licence holder must manage dust generation at the premises by:

(a) minimising dust from unsealed roads and exposed areas via the use of water carts or other alternate methods; and

(b) reducing or limiting dust generating activities at product and waste stockpiles.

Treated water discharges

18. The licence holder must ensure that where waste is emitted to surface water or land from the emission points in Table 8 and identified on the map of emission points in Schedule 1, it is done so in accordance with the conditions of this licence.

Table 8: Authorised discharge points

Emission	Discharge point	Discharge point location
Treated water processed via oil / water separators and the Arundel PTU to meet the discharge limit criteria specified in Table 10	McKnoes Brook	As shown in Figure 2 Schedule 1: McKnoes Brook Discharge Point
Treated wastewater from DAF Sumps 1, 2 and 3 (as shown in Figure 12 in Schedule 1, labelled as DAF Treated Water Ponds)	Flinders C Sump or Larego Water Storage Reservoir	As shown in Figure 12 of Schedule 1

19. The licence holder must ensure that emissions listed in Table 9 are released from the discharge point in accordance with the authorised discharge release rates specified in Table 9.

Table 9: Authorised discharge release rates

Emission	Discharge point	Authorised release rate[1]
Treated water processed via oil / water separators and the Arundel PTU	McKnoes Brook as shown in Figure 2, Schedule 1: McKnoes Brook Discharge Point	Not more than 10 L/second in a continuous release rate.
		Not more than 20 L/second release rate for 60 hours followed by 60 hours with no discharge, repeating.

Note 1: as measured by the McKnoes Brook discharge pipeline flowmeter

20. The licence holder must ensure that emissions from the discharge points listed in Table 10 do not exceed the parameter concentration limits specified in Table 10 when monitored in accordance with condition 5 and 26.

Table 10: Emission and discharge limits

Discharge point	Parameter	Limit	Unit
McKnoes Brook (sample locations from Arundel Treated Water Ponds 1, 2 and 3 (ATWP-001, ATWP-002 and ATWP-003) sample points (Figure 8))	pH[1]	6.5 - 8	n/a
	Total Dissolved Solids	1,000	mg/L
	Total Suspended Solids	25	
	Surfactants as MBAS	5	
	Total Phosphorus	0.2	
	Oil and Grease[3]	5	
	Total Recoverable Hydrocarbons	5	
	Chromium	0.0033	
	Copper	0.0014	
	Zinc	0.008	
	10:2 Fluorotelomer sulfonic acid (10:2 FTS)[2]	0.001 or <LOR	µg/L
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)[2]	0.001 or <LOR	
	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.005	
	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.005	
	Perfluoro-1-octanesulfonamidoacetic acid (FOSAA)[2,4]	0.005 or <LOR	
	Perfluorobutanesulfonic acid (PFBS)[2]	0.001 or <LOR	
	Perfluorobutanoic acid (PFBA)[2]	0.005 or <LOR	
	Perfluorodecanesulfonic acid (PFDS) (free acid)	0.001	
	Perfluorodecanoic acid (PFDA)	0.001	
	Perfluoroheptanesulfonic acid (PFHpS)	0.001	
	Perfluoroheptanoic acid (PFHpA)	0.001	
	Perfluorohexane sulfonic acid (PFHxS)	0.001	

Discharge point	Parameter	Limit	Unit
McKnoes Brook (sample locations from Arundel Treated Water Ponds 1, 2 and 3 (ATWP-001, ATWP-002 and ATWP-003) sample points (Figure 8))	Perfluorohexanoic acid (PFHxA)	0.001	µg/L
	Perfluorononanesulfonic acid (PFNS)	0.001	
	Perfluorononanoic acid (PFNA)	0.001	
	Perfluorooctane sulfonic acid (PFOS)	0.0002	
	Perfluorooctanoic acid (PFOA)	0.001	
	Perfluoropentane sulfonic acid (PFPeS)[2]	0.001 or <LOR	
	Perfluoropentanoic acid (PFPeA)[2]	0.001 or <LOR	
	Perfluorotridecanoic acid (PFTrDA)	0.001	
	Perfluoroundecanoic acid (PFUnDA or PFUnA)	0.001	
Flinders C Sump and Larego Water Storage Reservoir (discharge from DAF Treated Water Ponds 1, 2 and 3) (as shown in Figure 11 in Schedule 1)	pH[1]	4.7 - 9	n/a
	Total Dissolved Solids	1,000	mg/L
	Total Suspended Solids	80	
	Surfactants as MBAS	5	
	Total Phosphorus	2	
	Oil and Grease[3]	5	
	Total Recoverable Hydrocarbons	5	
	Chromium	0.06	
	Copper	1	
	Zinc	5	

Note 1: In-field non-NATA accredited analysis permitted.
Note 2: Where laboratory analysis reports a result <LOR, and the <LOR is greater than the corresponding numeric limit, this is a compliant result.
Note 3: to be sampled with USEPA method 5520B.
Note 4: Laboratory non-NATA accredited analysis permitted.

Monitoring

General monitoring

21. The licence holder must ensure that:

(a) all water samples are collected and preserved in accordance with AS/NZS 5667.1;

(b) all water samples for PFAS analysis are to be collected and preserved in accordance with the PFAS NEMP;

(c) all wastewater sampling is conducted in accordance with AS/NZS 5667.10;

(d) all surface water sampling is conducted in accordance with AS/NZS 5667.4, AS/NZS 5667.6 and AS/NZS 5667.9, as relevant;

(e) all groundwater sampling is conducted in accordance with AS/NZS 5667.11;

(f) laboratory sample must be analysed using the appropriate limit of reporting as to allow comparison with relevant environmental guidelines; and

(g) all sample analysis must be undertaken by laboratories with current NATA accreditation for the relevant parameters, unless otherwise specified in this Licence.

22. The licence holder must ensure that:

(a) monthly monitoring is undertaken at least 15 days apart;

(b) quarterly monitoring is undertaken at least 45 days apart; and

(c) six monthly monitoring is undertaken at least five months apart.

23. The licence holder must ensure that all monitoring equipment used to comply with conditions in this licence are operated and calibrated in accordance with the manufacturer's specifications.

Process Monitoring

24. The licence holder must record the total amount of waste accepted onto the premises, and processed on the premises, for each waste type listed in Table 11 in the corresponding unit, and for each corresponding time period, as set out in Table 11.

Table 11: Waste accepted onto the premises

Liquid waste type	Waste code	Unit	Time period
PFAS contaminated waters	M270	kL	Each load arriving at the Arundel PTU

25. The licence holder must undertake the monitoring in Table 12 according to the specifications in that table.

Table 12: Wastewater sampling requirements

Monitoring point reference	Parameter	Unit	Frequency	Averaging period	Method
Orion wastewater sump No. 3 (OS3) as shown in Figure 7 of Schedule 1	pH[1]	N/A	Monthly[3]	Spot sample	As per condition 21
	Total Dissolved Solids; Total Suspended Solids; Surfactants as MBAS; Total phosphorus; and Oil and Grease[2].	mg/L			
	21 PFAS compounds as listed in Table 10	µg/L			
	Chromium; Copper; and Zinc	mg/L	Six Monthly		
Arundel wastewater sump No. 4 (AP4) as shown in Figure 8 of Schedule 1	pH[1]	N/A	Monthly[3]		
	Total Dissolved Solids; Total Suspended Solids; Surfactants as MBAS; Total phosphorus; and	mg/L			

Monitoring point reference	Parameter	Unit	Frequency	Averaging period	Method
	Oil and Grease[2].				
	21 PFAS compounds as listed in Table 10	µg/L			
	Chromium; Copper; and Zinc	mg/L	Six monthly		
Arundel Pre-Treatment Dams 1 (APTD-001) and 2 (APTD-002) as shown in Figure 10 of Schedule 1	21 PFAS compounds as listed in Table 10	µg/L	Monthly[3]	Spot sample	As per condition 21

Note 1: In-field non-NATA accredited analysis permitted
Note 2: To be sampled with USEPA method 5520B
Note 3: Monthly monitoring not required when there is no wastewater in sumps and dams

Monitoring of point source emissions to surface water and land

26. The licence holder must undertake the monitoring in Table 13 and Table 14 according to the specifications in those tables.

Table 13: Monitoring of point source emissions to surface water

Monitoring point reference, as shown in Figure 8 of Schedule 1	Process description	Parameter	Unit	Frequency	Averaging period	Method
Arundel Treated Water Ponds 1, 2 and 3 (ATWP-001, ATWP-002 and ATWP-003) sample points (Figure 8)	Discharge from PTU to Arundel Treated water ponds 1, 2 and 3 (ATWP-001, ATWP-002 and ATWP-003) to McKnoes Brook	Cumulative volume	m^3 and tonnes	Continuous	Daily	-
		pH[1]	-	Prior to any discharge from Arundel Treated Water ponds 1, 2 or 3 (ATWP-001, ATWP-002 and ATWP-003) to Mcknoes Brook	Composite sample[3]	As per condition 21
		Total Dissolved Solids	mg/L			
		Total Suspended Solids				
		Chloride				
		Nitrate				
		Magnesium				
		Sodium				
		Sulfate				
		Surfactants as MBAS				
		Total Nitrogen				
		Total Phosphorus				
		Oil and Grease[2]				
		TRH				
		BTEX				
		PAH				
		Aluminium				
		Arsenic				
		Barium				
		Cadmium				
		Chromium				
		Cobalt				
		Copper				
		Lead				
		Manganese				
		Mercury				
		Molybdenum				
		Nickel				
		Zinc				
		21 PFAS compounds as listed in Table 10	µg/L			

Note 1: In-field non-NATA accredited analysis permitted.
Note 2: to be sampled with USEPA method 5520B

Note 3: Water samples will be automatically collected at the unit discharge to Arundel Treated Water Ponds 1, 2 and 3 (ATWP-001, ATWP-002 and ATWP-003) by an autosampler. A sample is scheduled for every 0.5 ML of treated water to form a composite sample which will be sent for laboratory analysis.

Table 14: Monitoring of point source emissions to land

Monitoring point reference, as shown in Figure 8 of Schedule 1	Process description	Parameter	Unit	Frequency	Averaging period	Method
Larego DAF Treated Storage Ponds 1, 2 and 3	Discharge from Larego DAF Treated Water Ponds 1, 2 and 3 to Flinders C Sump and Larego Water Storage Reservoir	Cumulative volume	m^3 and tonnes	Continuous	Monthly	-
		pH[1]	-	Prior to each discharge of wastewater unless there has been no addition of treated wastewater to the sumps since the last sampling event[2]	Spot sample	As per condition 21
		Total Dissolved Solids	mg/L			
		Total Suspended Solids				
		Chloride				
		Nitrate				
		Magnesium				
		Sodium				
		Sulfate				
		Surfactants as MBAS				
		Total Nitrogen				
		Total Phosphorus				
		Oil and Grease[4]				
		TRH				
		BTEX				
		PAH				
		Aluminium		Six monthly[3]		
		Arsenic				
		Barium				
		Cadmium				
		Chromium				
		Cobalt				
		Copper				
		Lead				
		Manganese				
		Mercury				
		Molybdenum				
		Nickel				
		Zinc				

Note 1: In-field non-NATA accredited analysis permitted.

Note 2: Sampling exempt if there is insufficient water to sample

Note 3: Sampling exempt if discharge does not occur at least six monthly

Note 4: To be sampled with USEPA method 5520B

Native vegetation monitoring

27. The licence holder shall perform an annual native vegetation health assessment of riparian and riparian adjacent vegetation along McKnoes Brook in accordance with the specifications in Table 15.

Table 15: Annual Vegetation Health Assessment

Health Assessment Parameter	Frequency	Response threshold
Assessment of vegetation health along four transects as shown in Figure 14 of Schedule 1	Once per year, during spring	Assessment to determine statistically detectable change in either: • Mean tree species stem counts within transects • Proportions of health category ratings of mean tree stem counts within transects • Obvious signs of erosion • Comparison of results between upstream transects and downstream transects

28. Should the Annual Vegetation Health Assessment required under condition 27 determine a statistically detectable change in any of the Response Thresholds described in Table 15, the licence holder shall engage a waterway health expert to consider potential sources of loss of health within 60 days of becoming aware of the change. The licence holder shall also review the PTU discharge regime and provide to the CEO a plan outlining the proposed changes to reduce further impacts to McKnoes Brook vegetation from the PTU discharge.

Ambient water quality monitoring

29. The licence holder must undertake the monitoring in Table 16 and Table 17 according to the specifications in those tables.

Table 16: Monitoring of ambient surface water quality

Monitoring point reference	Parameter	Unit	Averaging period	Frequency
McKnoes Brook Surface water sampling locations: - Discharge - T2 - T3 - T4 as shown in Figure 6 of Schedule 1	pH[1]	-	Spot sample	Quarterly[2]
	Redox potential (Eh)[1]	mV		
	Electrical conductivity[1]	µS/cm		
	Turbidity[1]	NTU		
	Dissolved oxygen[1]	mg/L		
	Total Dissolved Solids			
	Total Suspended Solids			
	Chloride			
	Nitrate			
	Magnesium			
	Sodium			
	Sulfate			

Monitoring point reference	Parameter	Unit	Averaging period	Frequency
McKnoes Brook Surface water sampling locations: - Discharge - T2 - T3 - T4 as shown in Figure 6 of Schedule 1	Surfactants as MBAS	mg/L	Spot sample	Quarterly [2]
	Total Nitrogen			
	Total Phosphorus			
	TRH			
	BTEX			
	PAH			
	Aluminium			
	Arsenic			
	Barium			
	Cadmium			
	Chromium			
	Cobalt			
	Copper			
	Lead			
	Manganese			
	Mercury			
	Molybdenum			
	Nickel			
	Zinc			
	21 PFAS compounds as listed in Table 10	µg/L		
McKnoes Brook water level monitoring device as shown in Figure 10 of Schedule 1	Relevant parameters, to allow calculation of daily streamflows at the McKnoes brook Discharge Point[3]	Depth (m)	Daily	Continuous, time series logged at a maximum of 15-minute intervals

Note 1: In-field non-NATA accredited analysis permitted

Note 2: Quarterly monitoring frequency doesn't apply in the event a sample is unable to be collected due to no flow conditions.

Note 3: In accordance with the *Water Monitoring Standardisation Technical Committee (WMSTC), National Industry Guidelines for hydrometric monitoring Part 1: Primary Measured Data*.

Table 17: Monitoring of ambient groundwater quality

Monitoring point reference, as shown in Figure 6 of Schedule 1	Parameter	Unit	Averaging period	Frequency
Monitoring bores: BH01 BH04 BH05 BH07 BH08 BH10 BH11	Standing water level	m (AHD) and mbgl	Spot sample	Monthly[2]
	pH[1]	-		
	Total Dissolved Solids	mg/L		
	Chloride			
	Nitrate			
	Magnesium			
	Sodium			
	Sulfate			
	Total Recoverable Hydrocarbons			
	BTEX			
	Aluminium			
	Arsenic			
	Barium			
	Cadmium			
	Chromium			
	Cobalt			
	Copper			
	Lead			
	Manganese			
	Mercury			
	Molybdenum			
	Nickel			
	Zinc			
	21 PFAS compounds as listed in Table 10	µg/L		

Note 1: In-field non-NATA accredited analysis permitted.

Note 2: Monthly monitoring frequency doesn't apply in the event a sample is unable to be collected due to an absence of sufficient water in the bore/s.

30. The licence holder must record the results of all monitoring activity required under this licence.

Records and reporting

31. The licence holder must, within 7 days of becoming aware of any non-compliance with conditions 10, 18, 19 and 20 of this licence, notify the CEO in writing of that non-compliance and include in that notification the following information:

(a) which condition was not complied with;

(b) the time and date when the non-compliance occurred;

(c) if any environmental impact occurred as a result of the non-compliance and if so what that impact is and where the impact occurred;

(d) the details and result of any investigation undertaken into the cause of the non-compliance;

(e) what action has been taken and the date on which it was taken to prevent the non-compliance occurring again; and

(f) what action will be taken and the date by which it will be taken to prevent the non-compliance occurring again.

32. The licence holder must record the following information in relation to complaints received by the licence 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 licence holder to investigate or respond to any complaint.

33. The licence holder must:

(a) undertake an audit of their compliance with the conditions of this licence during the preceding annual period; and

(b) prepare and submit to the CEO by no later than 31 of March each year, an Annual Audit Compliance Report for the previous annual period in the approved form.

34. The licence holder must submit to the CEO by no later than 31 March each year, an Annual Environmental Report for previous annual period for the conditions listed in Table 18, and which provides information in accordance with the corresponding requirement set out in Table 18.

Table 18: Annual Environmental Report

Condition	Requirement
-	A summary of any failure or malfunction of any pollution control equipment and any environmental incidents that have occurred during the annual period, including any actions taken.

10, 11 and 24	• A summary of the waste acceptance, treatment and removal at the premises (including volumes, waste types and disposal locations) presented in table format; and
	• A summary of wastewater volumes treated and discharged including
	  ○ breakdown of volumes generated each from Orion and Arundel mining areas
	  ○ an assessment of reliability of field procedures and laboratory results

Condition	Requirement
12 and 13	• A summary of inspections and maintenance performed to address the operational requirements in Table 6 and Table 7 during the annual period.
19, 20 and 26	• Tabulated monitoring data results and time-series graphs showing concentrations of all parameters over a minimum three-year period (where sufficient data allows) and compares discharge concentrations against any limits imposed under condition 20; • An assessment and interpretation of the data, including comparison to historical trends and compliance with any discharge limits imposed; and • An assessment of reliability of field procedures and laboratory results • Volume of water discharge to McKnoes Brook with a comparison against discharge rate limits.
24 and 25	Process monitoring data
27	A summary of results from the Annual Health Vegetation Assessment
29	• A tabulated summary of results from ambient ground water and surface water monitoring, as well as all raw data provided in an accompanying Microsoft Excel spreadsheet digital document/file (or a compatible equivalent digital document/file), with all results being clearly referenced to laboratory certificates of analysis; • Water level monitoring data and calculation of daily streamflows at the McKnoes brook Discharge Point including: ○ Volumes reported graphically and tabularly, in m^3/sec providing flows for the entirety of the annual period at Mcknoes Brook monitoring point; ○ Provide evidence that quality assurance has occurred to confirm accuracy of streamflow volumes derived from the McKnoes Brook streamflow device using discrete discharge measurement methods once annually (for a stable artificial flow control structure). Guidance on quality assurance requirements can be found in *WMSTC, National Industry Guidelines for hydrometric monitoring. Part 6: Stream Discharge Relationship Development and Maintenance. section 7 quality assurance and validation.* • A diagram with aerial image overlay showing all monitoring locations and depicting groundwater level contours and flow direction (relevant site features including discharge points and other potential sources of emissions must also be shown); • An interpretive summary and assessment of the results against relevant assessment levels for surface water and groundwater, as published in the Guideline Assessment and Management of Contaminated Sites and the PFAS National Environment Management Plan (as amended from time to time); • An interpretive summary and assessment of results against previous monitoring results over a minimum three-year period (where sufficient data allows); and • Trend graphs to provide a graphical representation of historical results and to support the interpretive summary.
31	Summary of non-compliances with conditions 10, 18, 19 and 20 of the licence
32	A summary of complaints received, and any action taken to investigate or respond to any complaint.
33	Annual Audit Compliance Report

Note 1: General guidance on report presentation can be found in the Department's *Guideline: Assessment and management of contaminated sites*.

35. The licence holder must maintain accurate and auditable books including the following records, information, reports, and data required by this licence:

(a) the calculation of fees payable in respect of this licence;

(b) the works conducted in accordance with condition 1 of this licence;

(c) any maintenance of infrastructure that is performed in the course of complying with condition 12 of this licence;

(d) monitoring programmes undertaken in accordance with conditions 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, and 29 and of this licence; and

(e) complaints received under condition 32 of this licence.

36. The books specified under condition 35 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 licence holder for the duration of the licence; and

(d) be available to be produced to an inspector or the CEO as required.

Definitions

In this licence, the terms in Table 19 have the meanings defined.

Table 19: Definitions

Term	Definition
ACN	Australian Company Number
AEP	Annual exceedance probability
Annual Audit Compliance Report (AACR)	means a report submitted in a format approved by the CEO (relevant guidelines and templates may be available on the Department's website).
annual period	a 12 month period commencing from 1 January until 31 December in each year
APTD-001 and APTD-002	means Arundel Pre-treatment dam 001 and Arundel Pre-treatment dam 002 as shown in Figure 2 and Figure 8
Arundel mining area infrastructure	means the overland ore conveyor 371 (CV371), the Arundel 371/374 Transfer Station, the PTU and all other fixed plant located at the Arundel site depicted in Figure 1
Assessment of Site Contamination NEPM	means the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended from time to time;
Guideline: Assessment and management of contaminated sites	means the document titled Assessment and management of contaminated sites, Contaminated sites guidelines (Department of Environment Regulation, December 2014), as amended from time to time
books	has the same meaning given to that term under the EP Act.
BTEX	Means Benzene, Toluene, Ethylbenzene, m&p-Xylene, o-Xylene and Total-Xylene
CEO	means Chief Executive Officer of the Department. "submit to / notify the CEO" (or similar), means either: Director General Department administering the *Environmental Protection Act 1986* Locked Bag 10 Joondalup DC WA 6919 or: info@dwer.wa.gov.au
condition	a condition to which this licence is subject under section 62 of the EP Act.
Controlled Waste Regulations	*Environmental Protection (Controlled Waste) Regulations 2004* (WA).

Term	Definition
dampened	means moist to the touch
Department	means the department established under section 35 of the *Public Sector Management Act 1994* (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3.
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.
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
Guideline: Assessment and management of contaminated sites	means the document titled *Assessment and management of contaminated sites* (Contaminated sites guidelines) (Department of Environment Regulation, December 2014).
licence	refers to this document, which evidences the grant of a licence by the CEO under section 57 of the EP Act, subject to the specified conditions contained within.
Landfill Definitions	*Landfill Waste Classification and Waste Definitions 1996* (as amended from time to time)
licence holder	refers to the occupier of the premises, being the person specified on the front of the licence as the person to whom this licence has been granted.
LOR	means Limit of Reporting
m(AHD)	means metres in Australian Height Datum
mbgl	means metres below ground level
PAH	means Polycyclic Aromatic Hydrocarbons
PFAS	means per-and polyfluoroalkyl substances
PFAS NEMP	Heads of EPA Australia and New Zealand 2020, *PFAS National Environmental Management Plan Version 2.0*
PLC	means Programmable logic controller
premises	refers to the premises to which this licence applies, as specified at the front of this licence and as shown on the premises maps (Figures 1 – 9) in Schedule 1 to this licence and defined by the coordinates listed in Schedule 2 to this licence.
prescribed premises	has the same meaning given to that term under the EP Act.
PTU	means PFAS water treatment unit as shown in Figure 2 and Figure 3
suitably qualified	means a person who holds a tertiary academic qualification in engineering and

Term	Definition
civil engineer	has a minimum of three years of experience working in the area of civil/construction engineering
TRH	means Total Recoverable Hydrocarbons
waste	has the same meaning given to that term under the EP Act.
waste type	waste types identified in the Landfill Definitions, or in Schedule 1 of the Controlled Waste Regulations (as applicable).
WMSTC	means Water Monitoring Standardisation Technical Committee

END OF CONDITIONS

Schedule 1: Maps

Premises map

The boundary of the prescribed premises is shown in the map below (Figure 1).

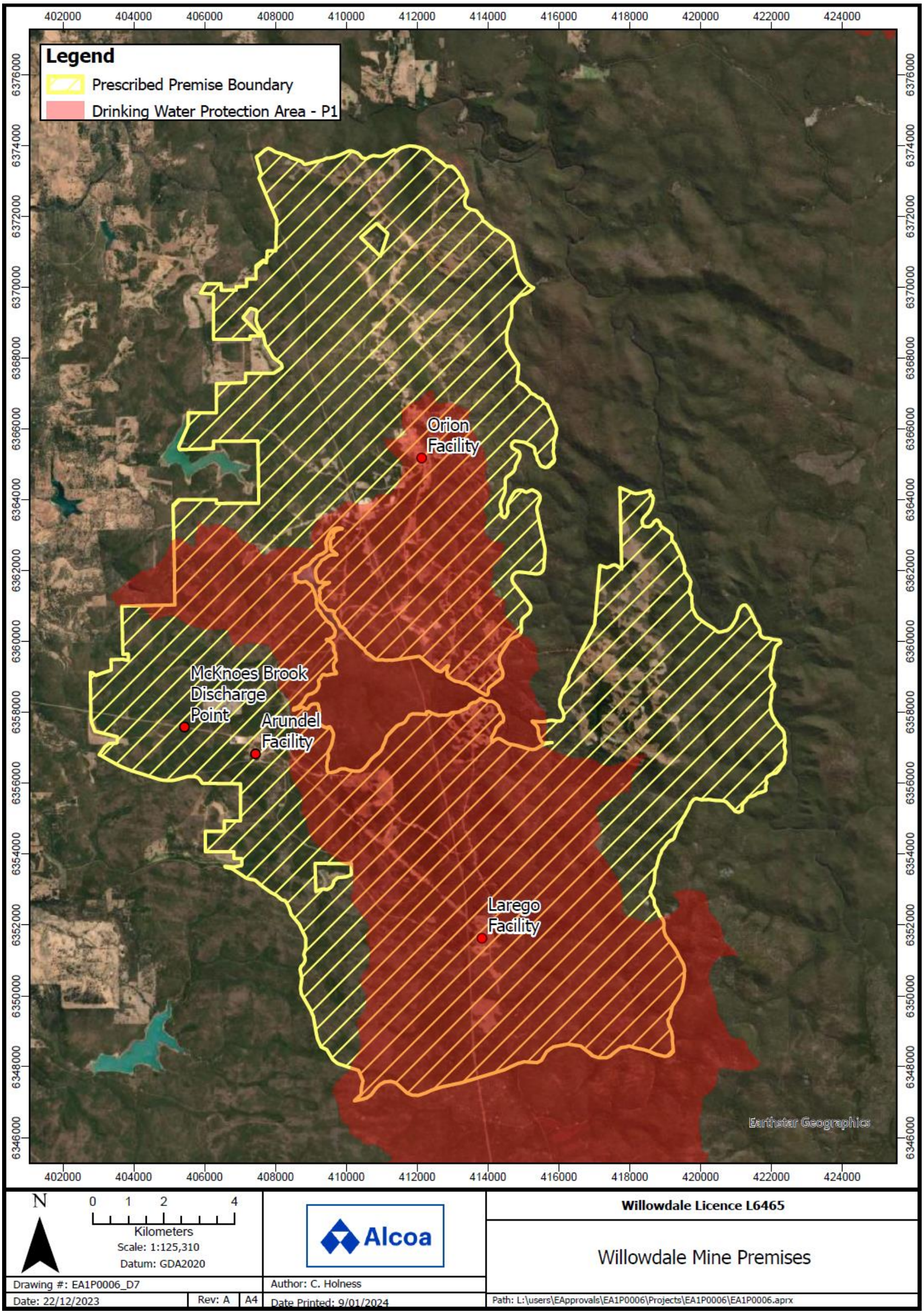


Figure 1: Map of the boundary of the prescribed premises

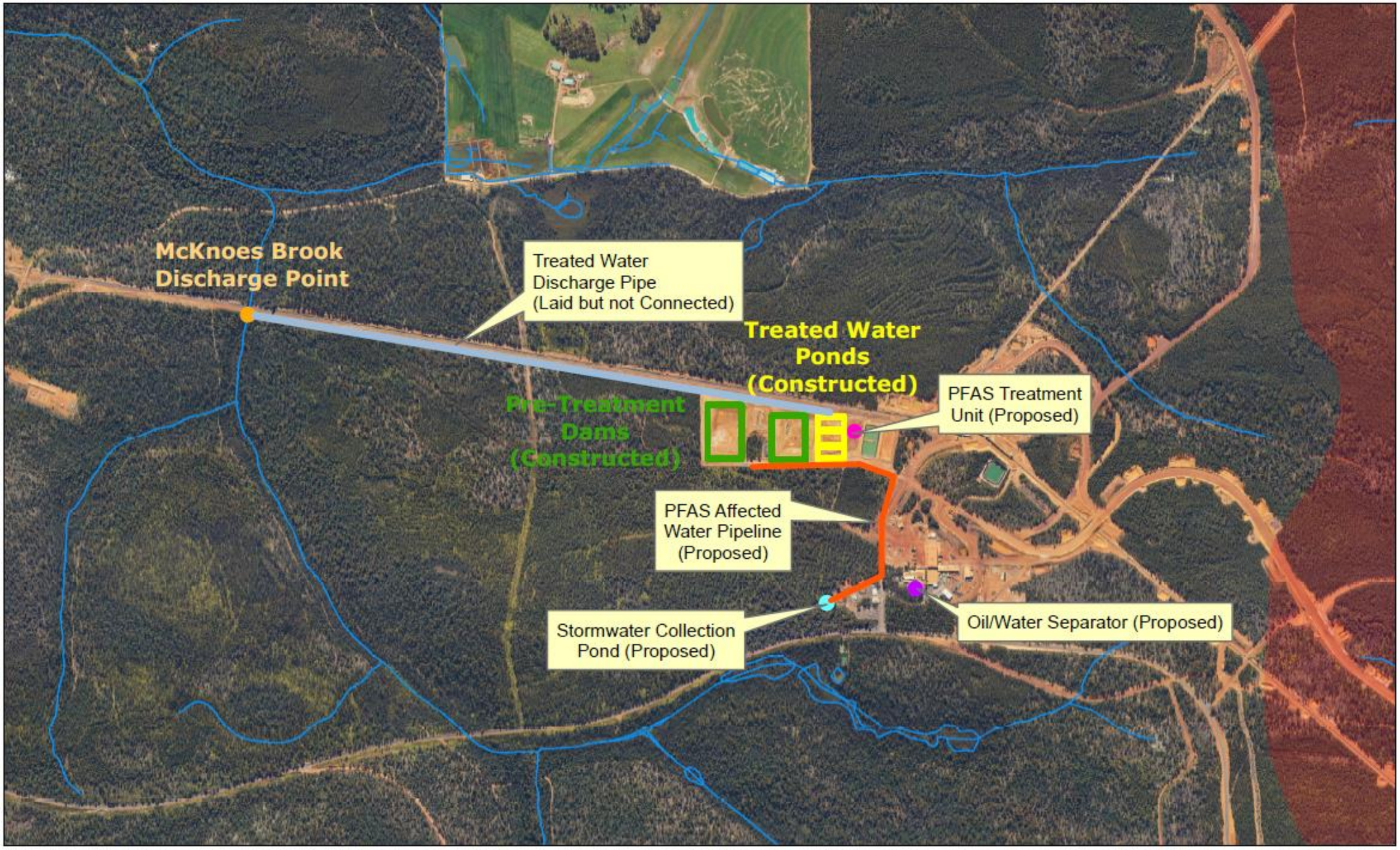


Figure 2: Layout of Arundel PFAS water treatment system and discharge point to McKnoes Brook

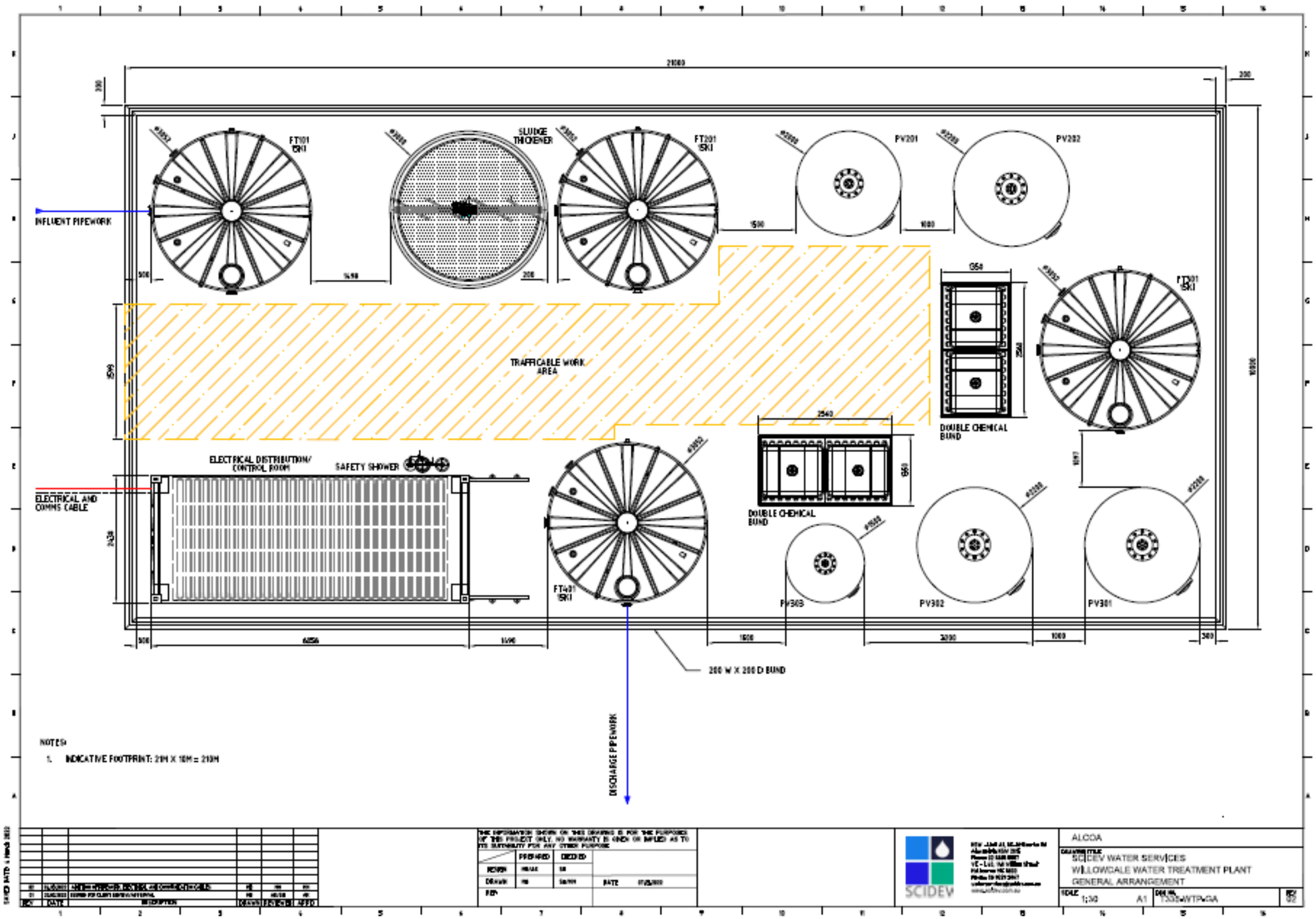


Figure 3: PFAS Treatment Unit layout drawing

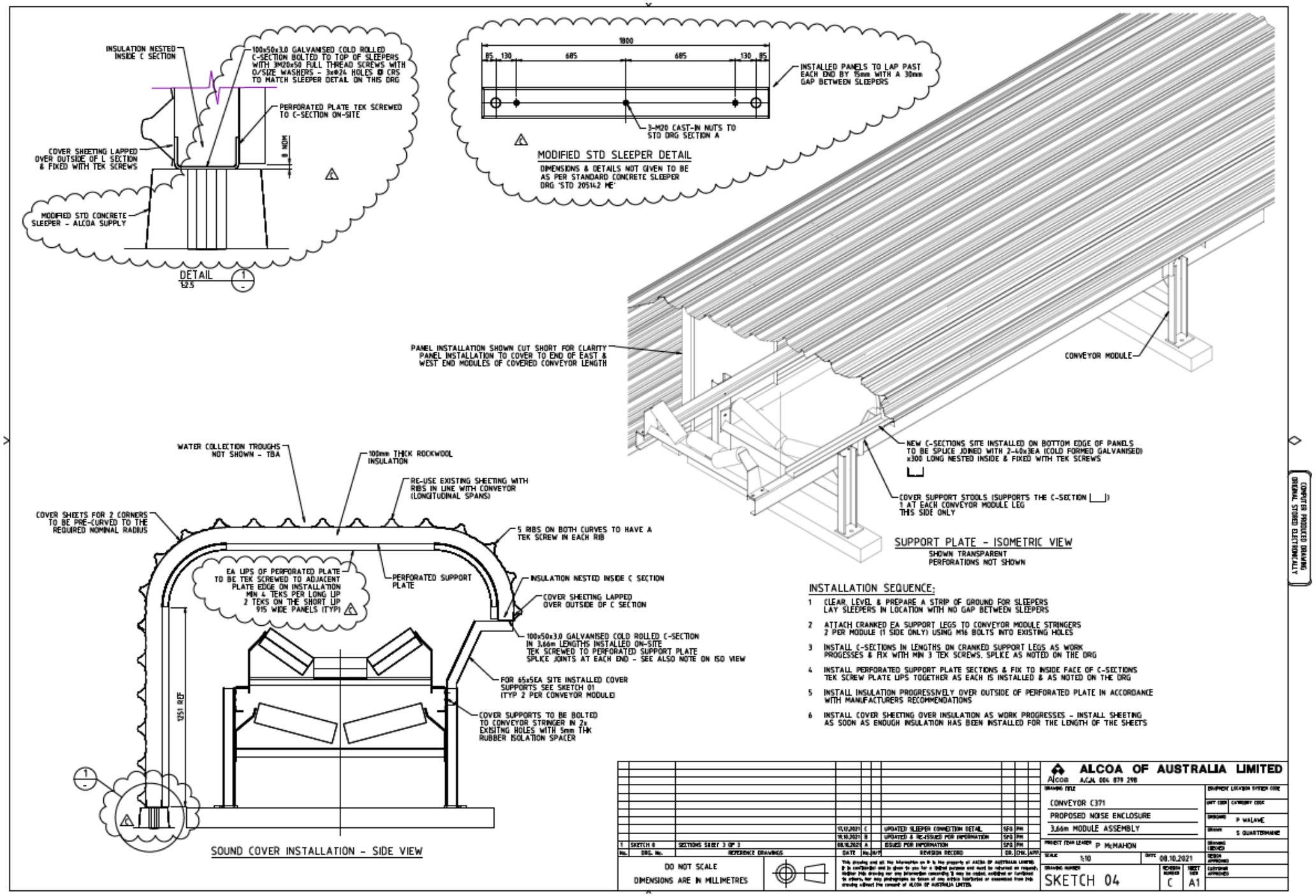


Figure 4: Conveyor 371 Noise enclosure

Figure 5: Willowdale mine ore conveyor infrastructure and nearest noise sensitive premises (R1)

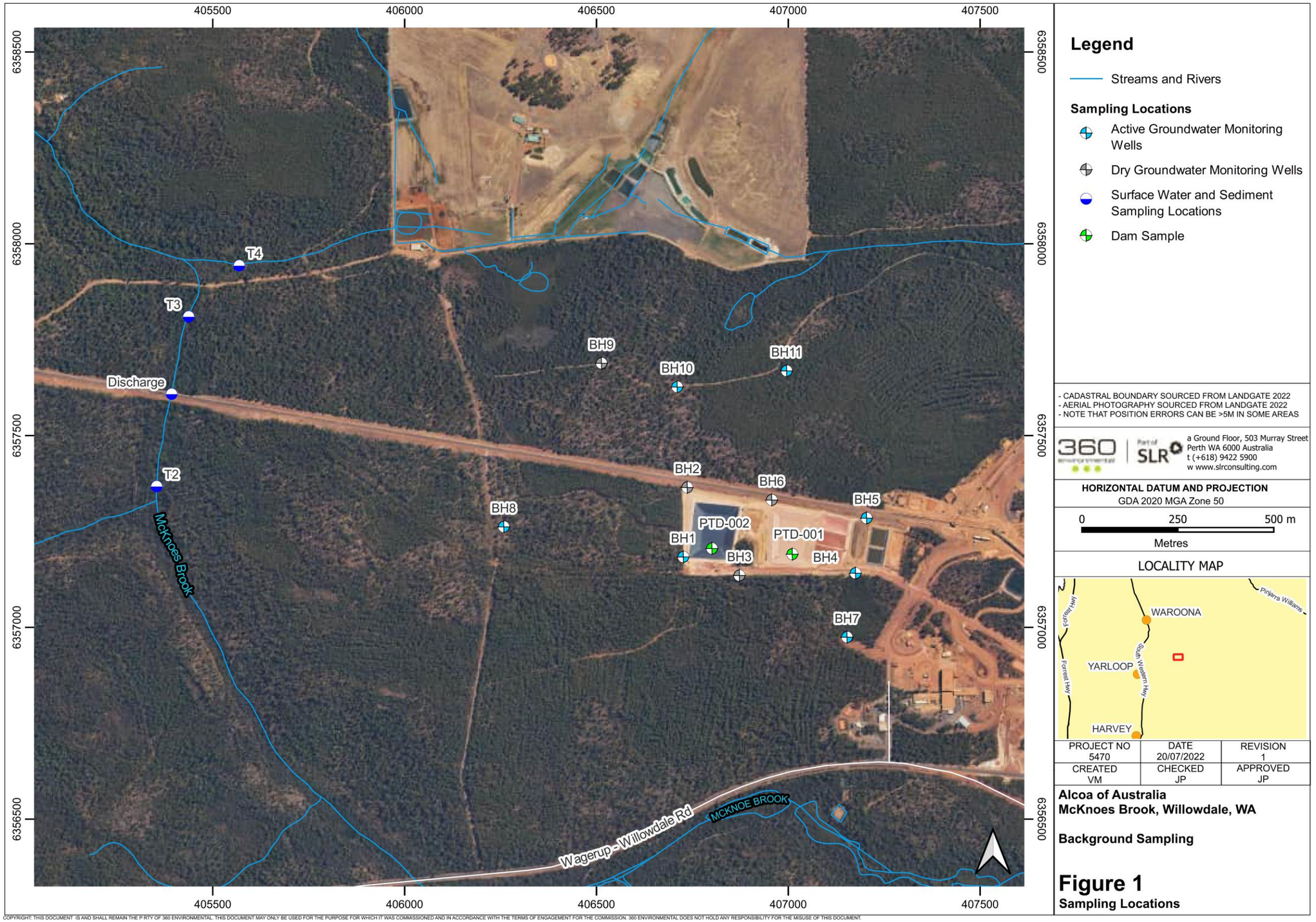


Figure 6: Surface water sampling locations within McKnoes Brook and groundwater monitoring bore locations around the PTU

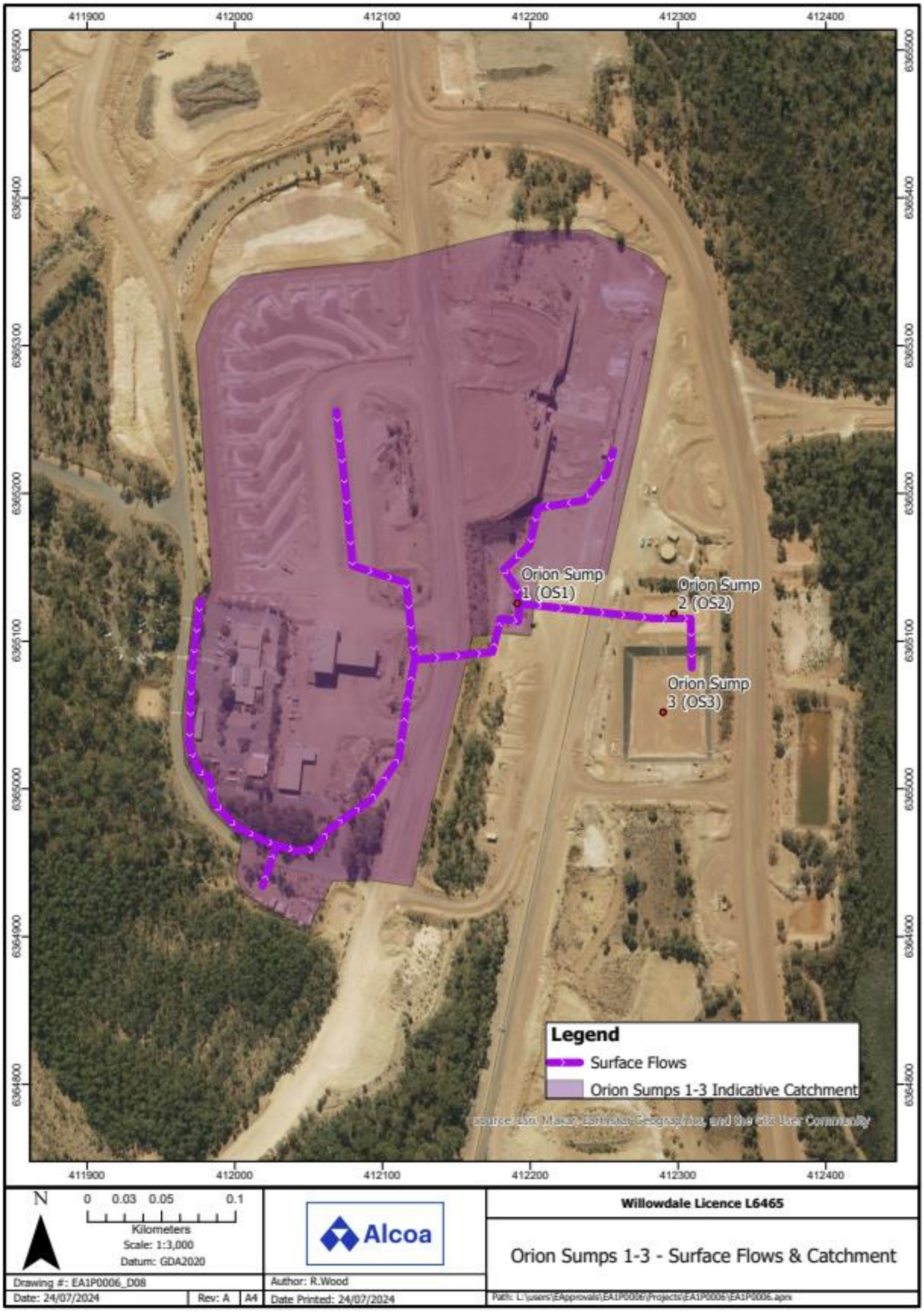
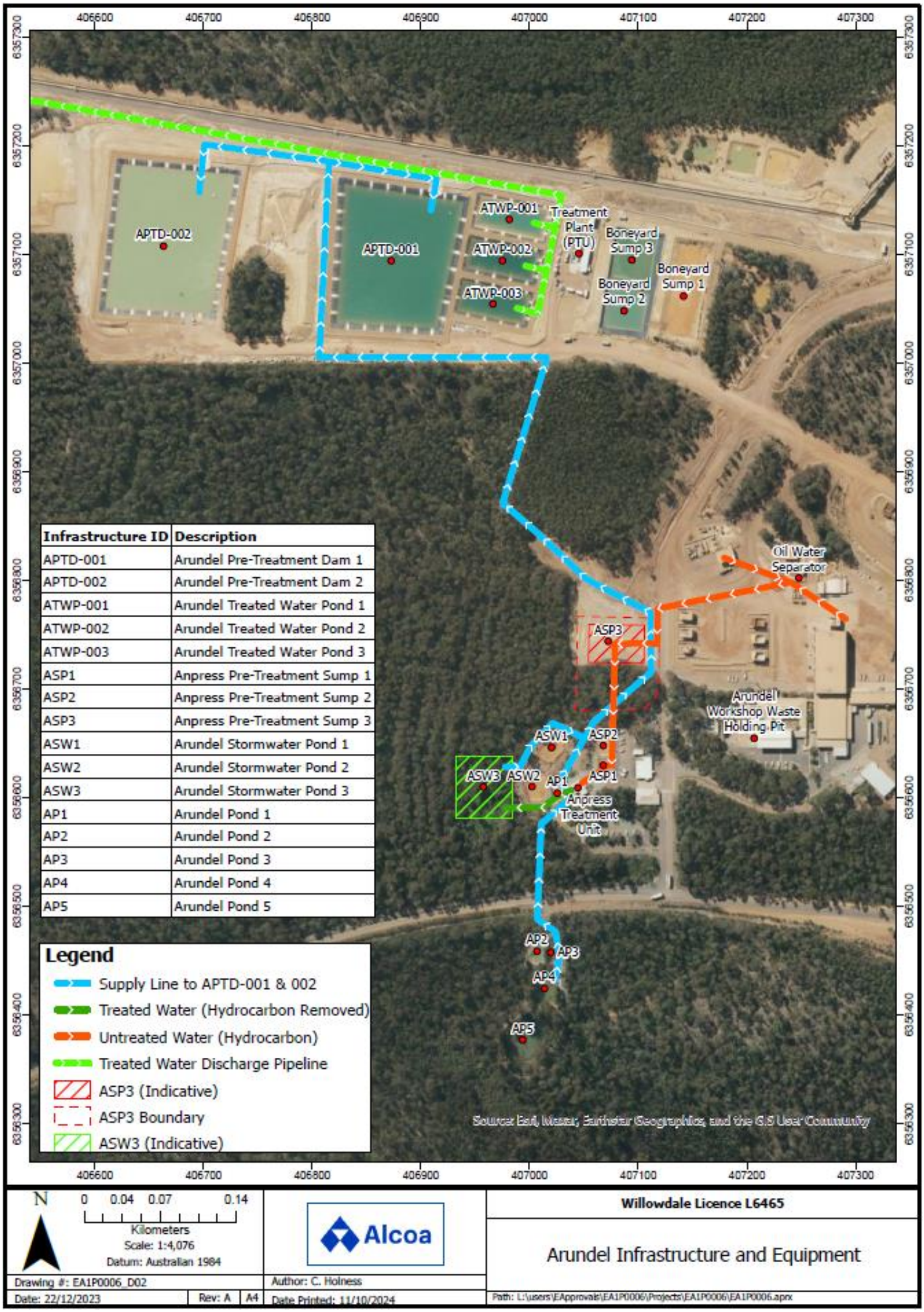
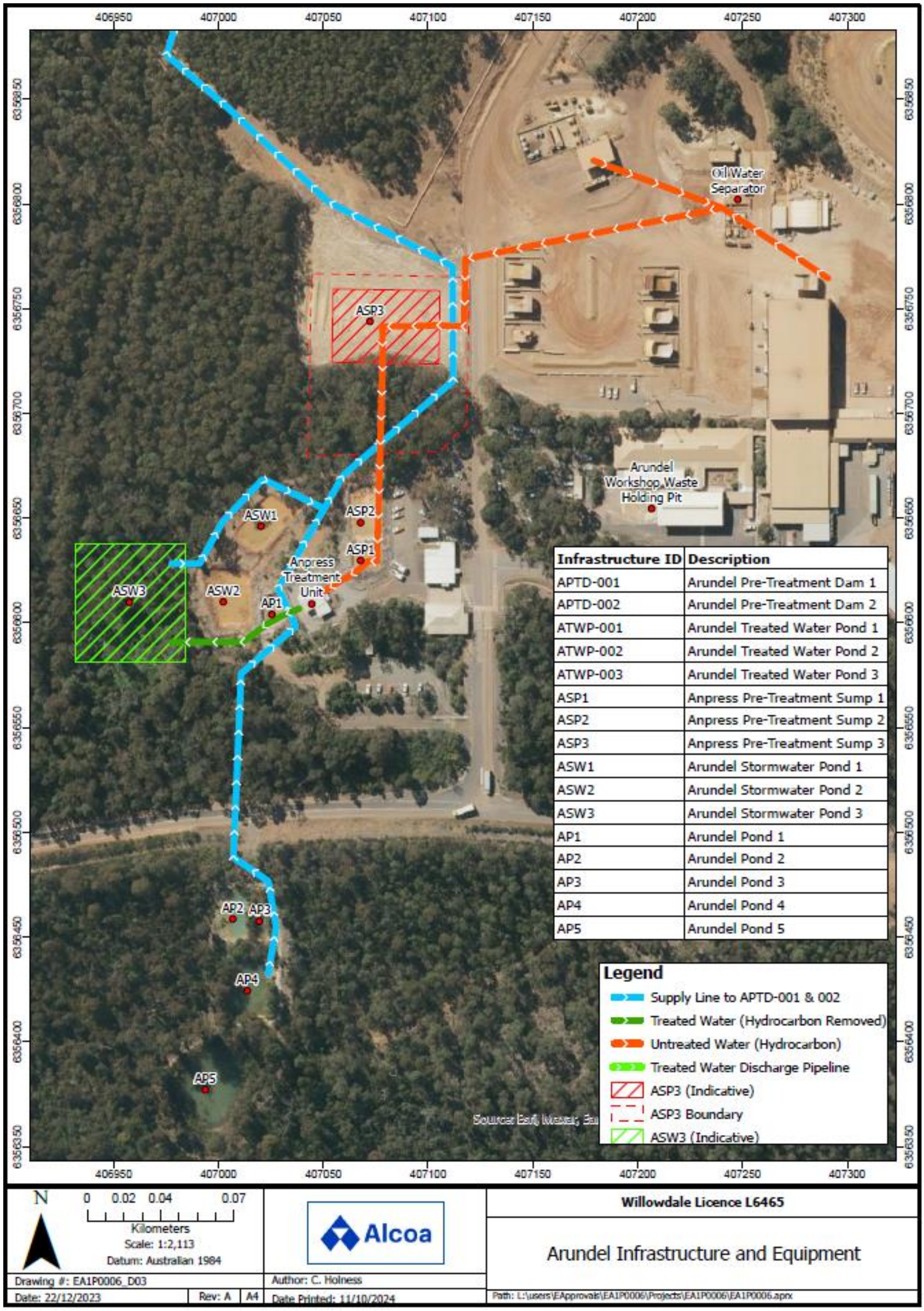


Figure 7: Orion site layout and drainage plan



Infrastructure ID	Description
APTD-001	Arundel Pre-Treatment Dam 1
APTD-002	Arundel Pre-Treatment Dam 2
ATWP-001	Arundel Treated Water Pond 1
ATWP-002	Arundel Treated Water Pond 2
ATWP-003	Arundel Treated Water Pond 3
ASP1	Anpress Pre-Treatment Sump 1
ASP2	Anpress Pre-Treatment Sump 2
ASP3	Anpress Pre-Treatment Sump 3
ASW1	Arundel Stormwater Pond 1
ASW2	Arundel Stormwater Pond 2
ASW3	Arundel Stormwater Pond 3
AP1	Arundel Pond 1
AP2	Arundel Pond 2
AP3	Arundel Pond 3
AP4	Arundel Pond 4
AP5	Arundel Pond 5

Figure 8: Arundel site layout and drainage plan



Infrastructure ID	Description
APTD-001	Arundel Pre-Treatment Dam 1
APTD-002	Arundel Pre-Treatment Dam 2
ATWP-001	Arundel Treated Water Pond 1
ATWP-002	Arundel Treated Water Pond 2
ATWP-003	Arundel Treated Water Pond 3
ASP1	Anpress Pre-Treatment Sump 1
ASP2	Anpress Pre-Treatment Sump 2
ASP3	Anpress Pre-Treatment Sump 3
ASW1	Arundel Stormwater Pond 1
ASW2	Arundel Stormwater Pond 2
ASW3	Arundel Stormwater Pond 3
AP1	Arundel Pond 1
AP2	Arundel Pond 2
AP3	Arundel Pond 3
AP4	Arundel Pond 4
AP5	Arundel Pond 5

Figure 9: Arundel infrastructure and equipment

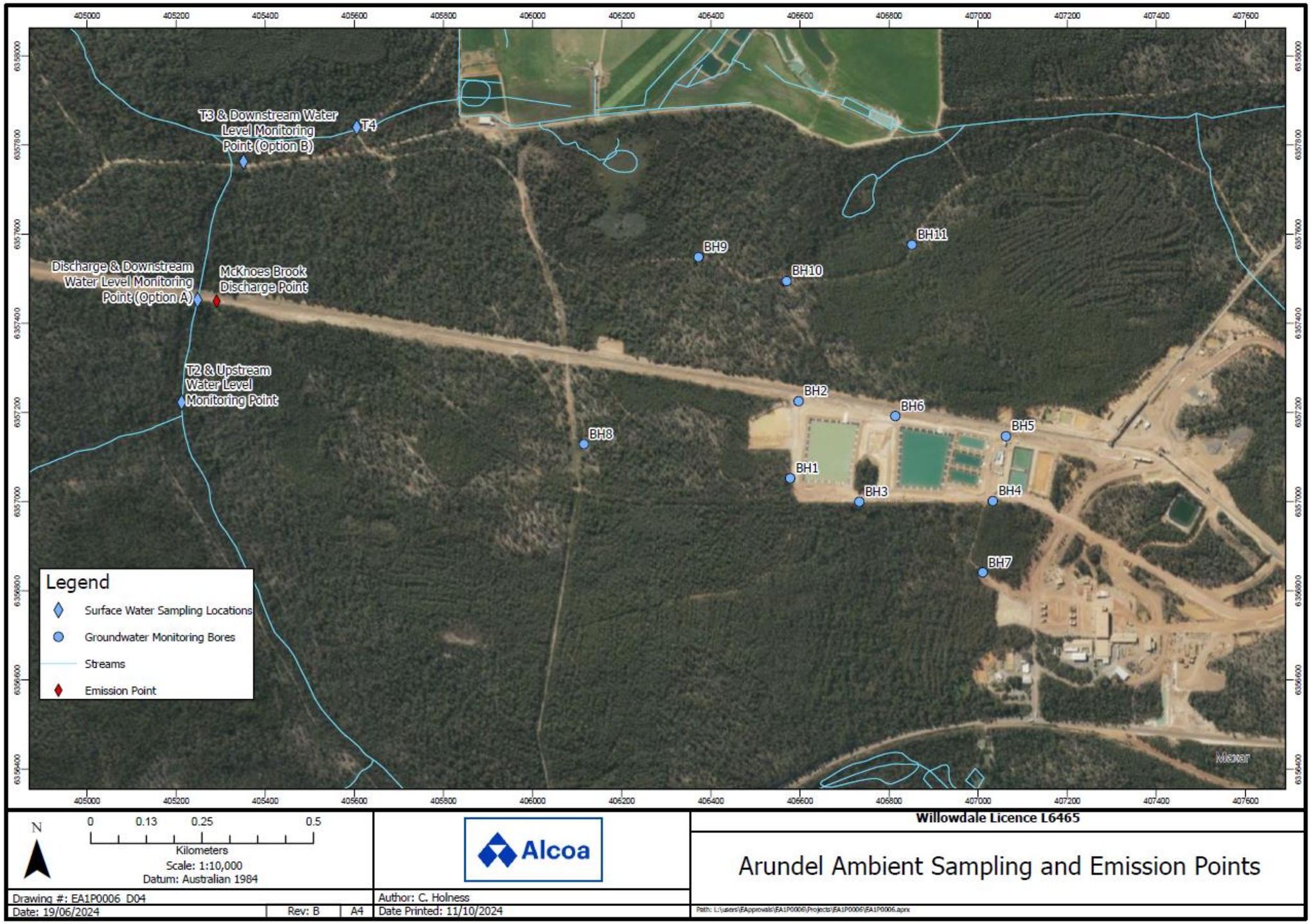


Figure 10: Arundel Infrastructure and equipment continued

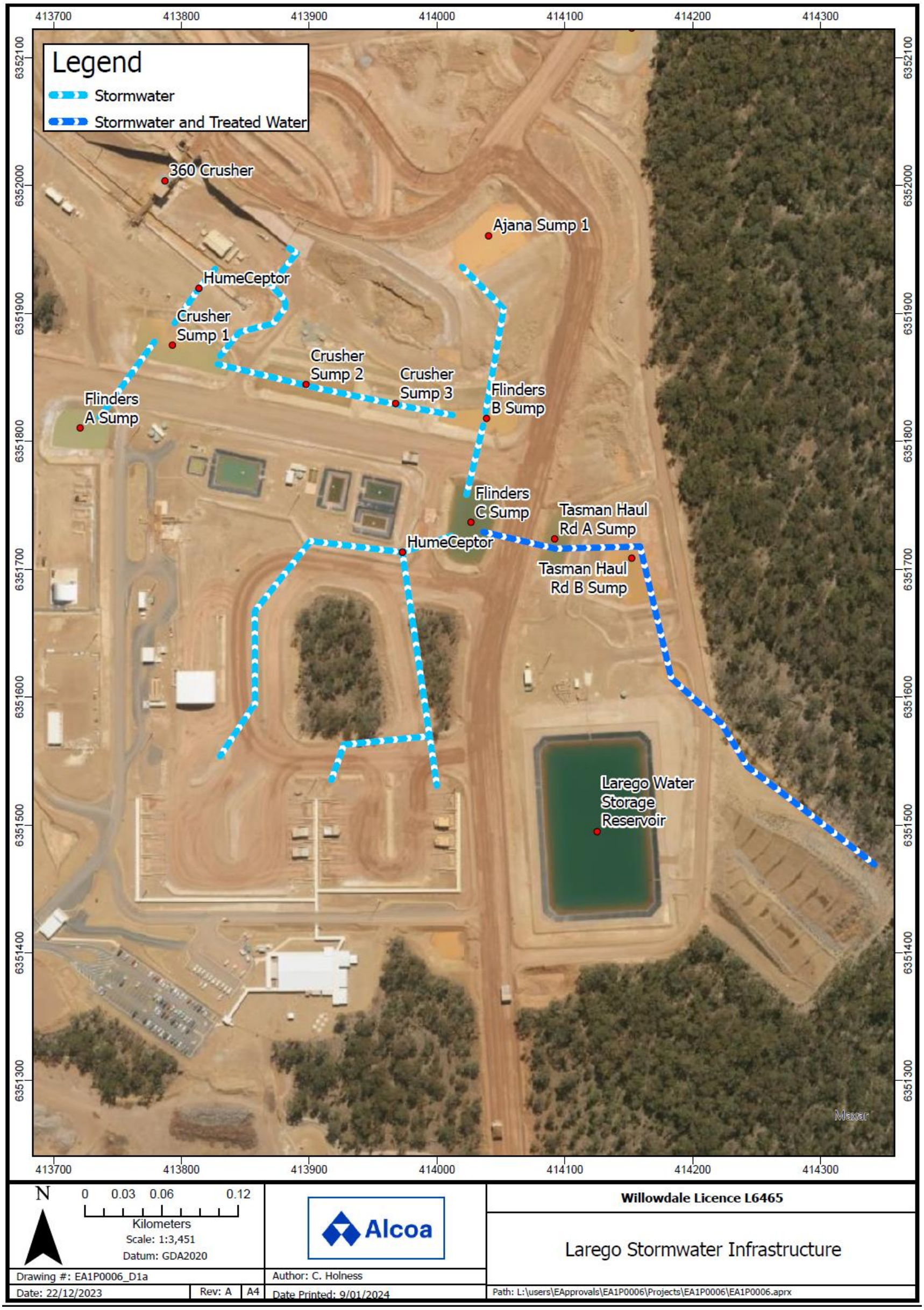


Figure 11: Larego site layout and stormwater infrastructure

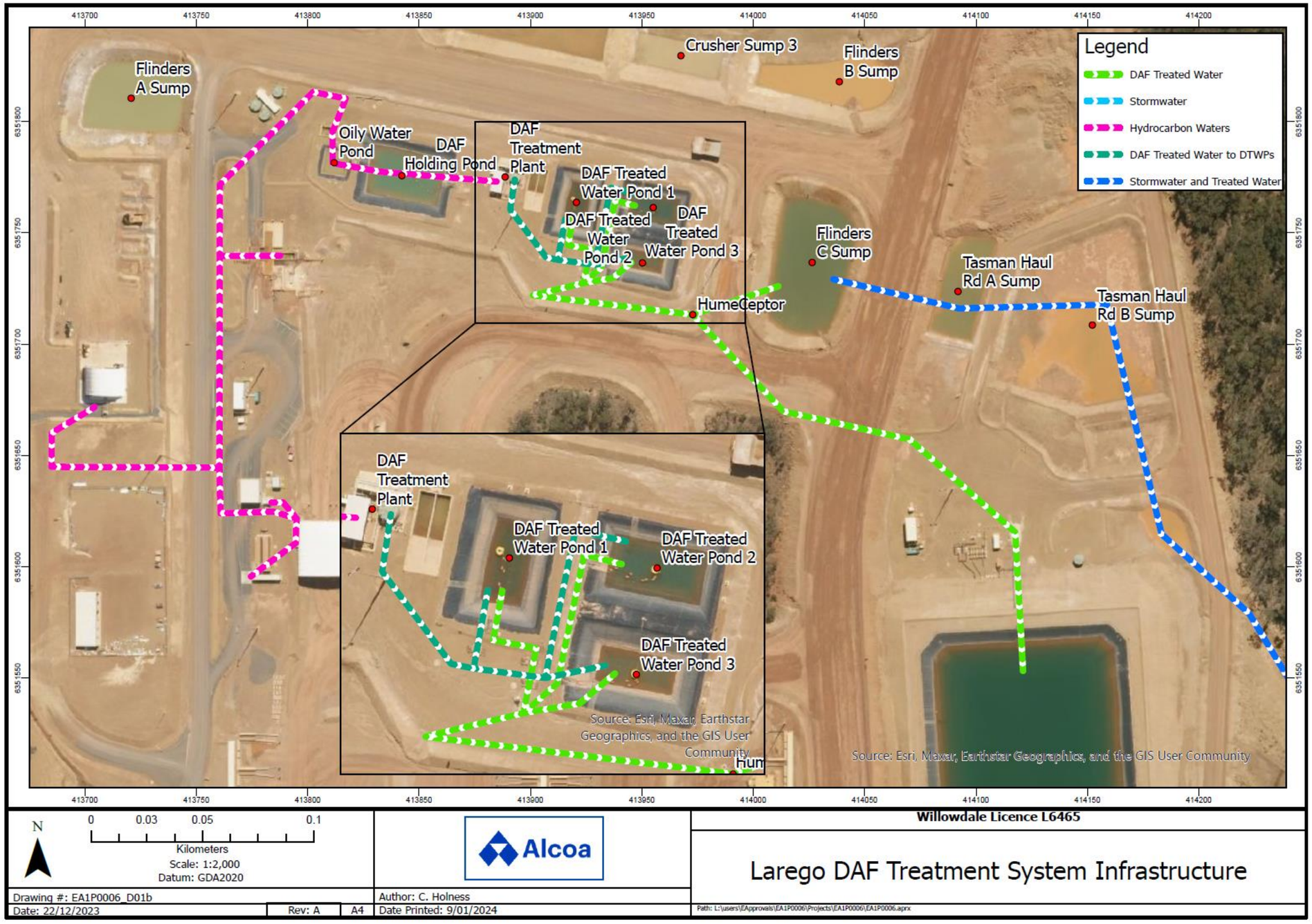


Figure 12: DAF Treatment system infrastructure

Figure 13: Anpress Treatment System Layout

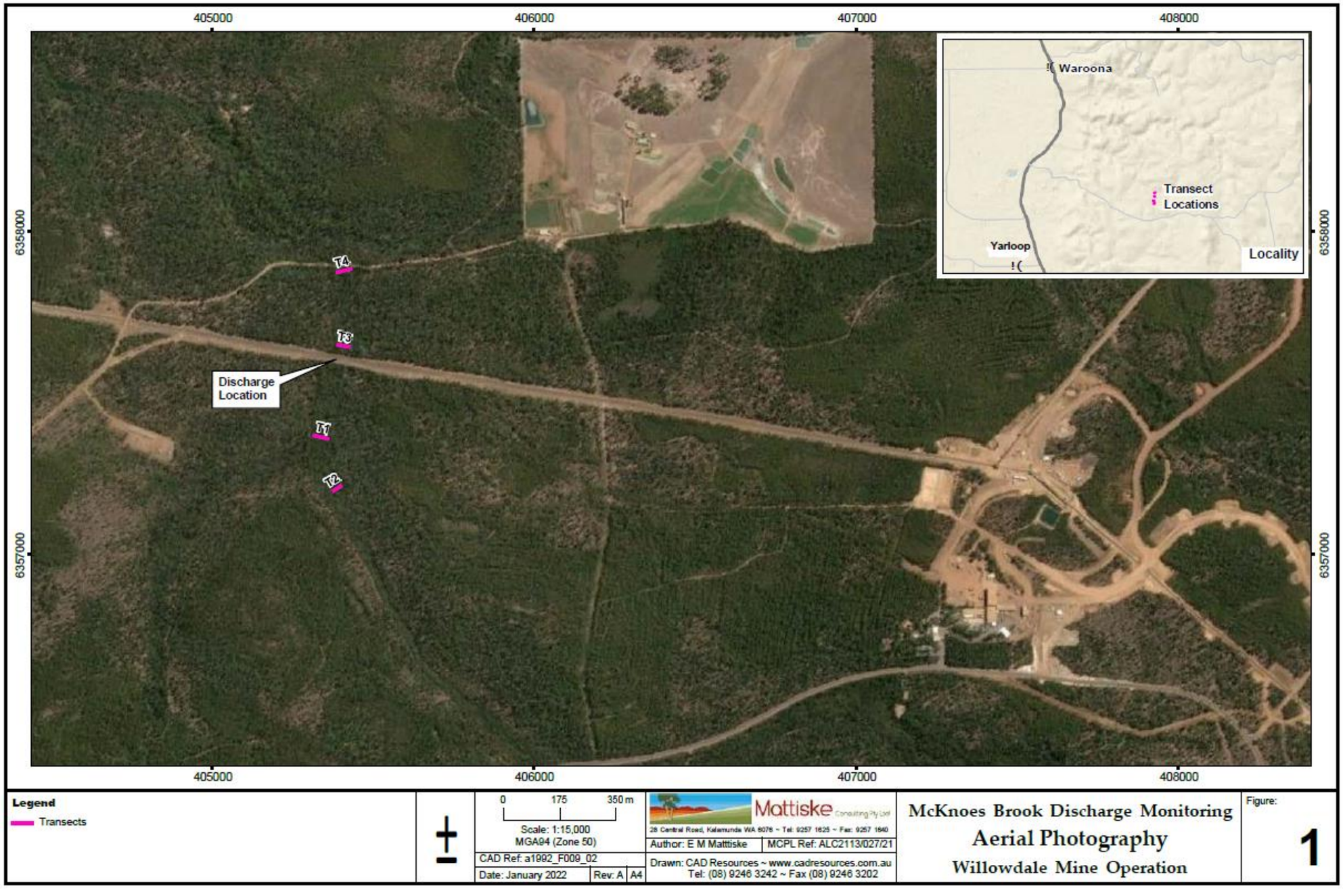


Figure 14: McKnoes Brook Baseline Flora and Vegetation Transect locations