Alcoa of Australia Limited

Attachment 3B: L6465/1989/10 Amendment Supporting Document

September 25

[redacted]

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Table Index

Figure Index

1. Introduction

Alcoa of Australia Limited (Alcoa) is the owner and proponent of the Willowdale Mine (Willowdale), ~100 km southeast of Perth in Western Australia. Operations at Willowdale are approved under Part V Division 3 of the *Environmental Protection Act 1986* (EP Act) via Environmental Licence L6465/1989/10.

This document has been prepared to support an application to amend L6465/1989/10. The amendments include:

- Removal of noise conditions required to protect Receptor R1 (Section 2).
- Updates to pipeline and drainage routes (Section 3).
- Amendments to the location of the ASP3 and ASW3 at the Arundel Mine Area (Section 4).
- Provisions to permit spot sampling of Arundel Treated Water Ponds in the event of the PFAS Treatment Unit (PTU) autosampler failing (Section 5).
- Removal of completed conditions (Section 6).
- Provision of updated figures and a reduction in the number of figures in the licence from fourteen to seven (Section 7).
- Other administrative amendments (Section 8).

The purpose of this supporting document is to describe and provide a justification for each proposed amendment. The amendments do not change existing environmental risks or siting considerations which are accordingly not reassessed.

Each proposed amendment is described under the headings below. Where relevant, existing conditions are written in *italics* with text proposed to be added in *red* and text proposed to be removed in ~~*strikethrough*~~.

2. Noise Conditions

2.1 Relevant Conditions and Background

Table 1 of Condition 1 requires Alcoa to implement Noise mitigation infrastructure and works at Arundel by 31 December 2025 (Noise Mitigation Works). Conditions 6 to 9 set noise assessment and reporting requirements for that infrastructure. The Noise Mitigation Works required in Table 1 are:

- Sealing of gaps between acoustic panels on the upper floor of the Arundel transfer station.
- Installation of a 2.5 km enclosure (Noise Enclosure) around conveyor 371 by 31 December 2025.

These conditions were added to the Environmental Licence as the assigned levels in the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations) were exceeded at nighttime at residential receptor R1, located on Lot 657 on Plan 123664 (Lot 657). The assessment and reporting requirements in Conditions 6-9 specifically address noise levels at that receptor.

The Noise Mitigation Works have been partially completed. The gaps between acoustic panels at the Arundel Transfer Station have been sealed; however, the Noise Enclosure has not been installed. Completion of the Noise Mitigation Works means installation of the Noise Enclosure.

R1 and the location of Noise Mitigation Infrastructure are shown on Figure 2-1.

2.2 Change in Status of R1

R1 is no longer used as a residential premises. The building is used as an office during the day, and is unoccupied at nighttime. Due to this change, R1 is no longer a *Noise Sensitive Premises: highly sensitive area*. The assigned level of 60 dB(A) for *Noise sensitive premises: any area other than highly sensitive area* continues to apply to Lot 657.

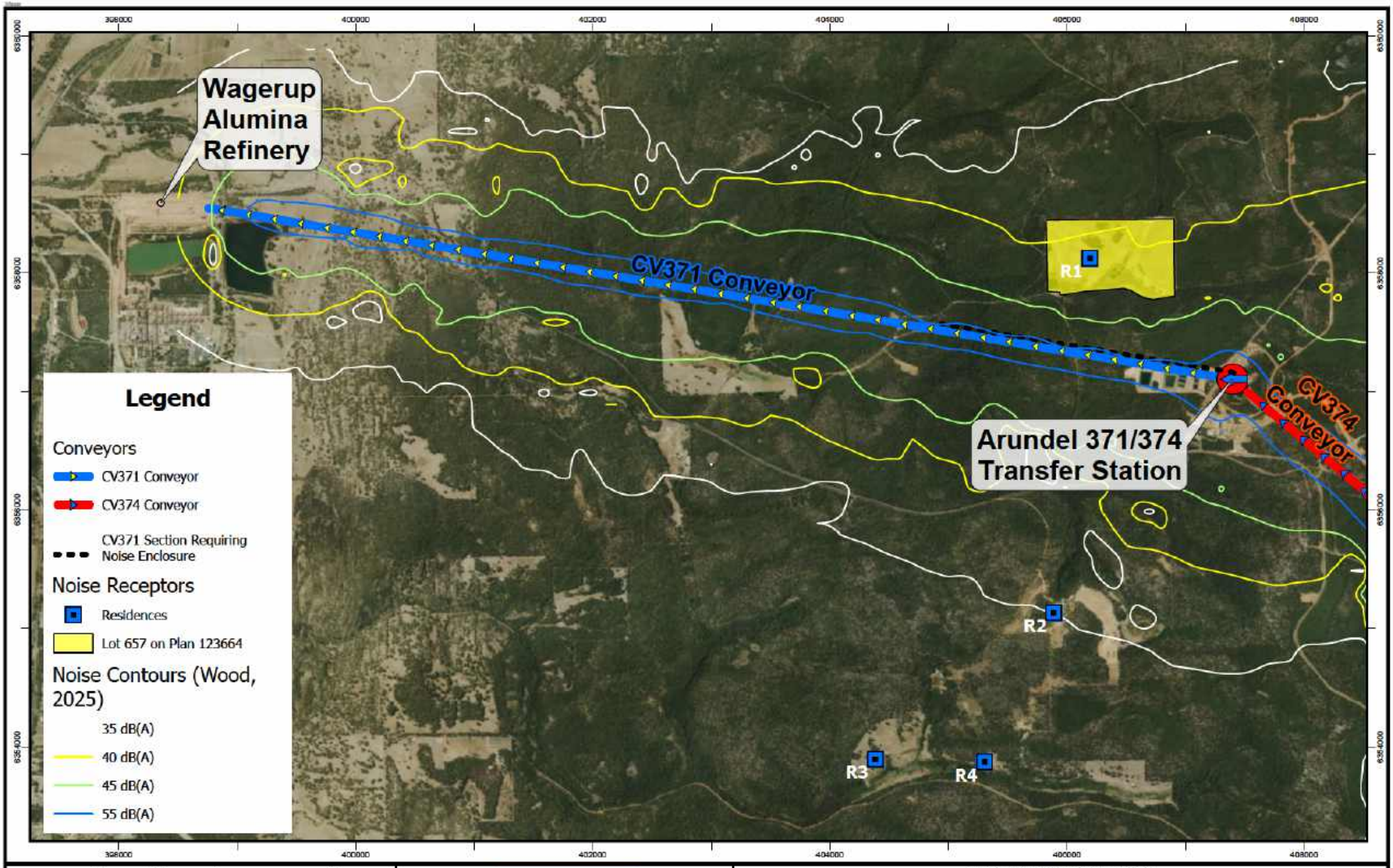

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Figure 2-1 Noise Mitigation Works

Drawing #: Figure 2-1 Noise Mitigation Works			Author: smita
Date: 19/09/2025	Rev: A	A4	Date Printed: 19/09/2025

2.3 Compliance with Noise Regulations

Wood have reviewed the noise model for Willowdale to determine whether completion of the Noise Mitigation Works is required for compliance with the assigned levels in the Noise Regulations at R1 or other receptors.

A copy of the assessment (Wood, 2025) is attached as Appendix 1. Noise receptors and modelled noise contours under worst-case conditions are shown on Figure 2-1. The contours on this figure include noise from both fixed and mobile equipment.

This noise assessment includes the 8dB(A) reduction in sound output from the Arundel transfer station measured in November 2021 after most of the gaps in the acoustic panels had been sealed. It does not include:

- Any further reduction in sound output associated with the sealing of remaining gaps by December 2021.
- The Noise Enclosure on CV371, which has not been installed.

In addition to worst-case meteorological conditions, the noise model also assumes that mining is occurring in the areas closest to receptors.

To determine whether completion of the Noise Mitigation Works via installation of the Noise Enclosure is required to ensure compliance at sensitive receptors the following approach was used:

- The noise contribution from fixed plant only was first considered. As this operates continuously and cannot be moved, if noise from fixed plant exceeds assigned levels then completion of the Noise Mitigation Works (or other suitable noise mitigation) is required.
- The total noise contribution from fixed plant and mobile equipment was then considered. Where the noise received from fixed plant is compliant, but noise from fixed plant and mobile equipment results in an exceedance of the assigned levels, then completion of the Noise Mitigation Works is not required; however, the locations and movements of mobile equipment need to be managed to ensure assigned levels are not exceeded.

Predicted noise at receptors from fixed plant only and from fixed plant and mobile equipment are provided in Table 2-1 and noise contours (from fixed plant and mobile equipment) are shown on Figure 2-1. The results show that:

- Noise received from fixed plant is within relevant assigned levels at all receptors, including R1.
    - Completion of the Noise Mitigation Works is not required to ensure noise from Alcoa's activities does not exceed assigned levels at sensitive receptors.

- Noise from fixed plant and mobile equipment is within assigned levels at all receptors, except R2.
    - A marginal exceedance of 0.1 dB(A) is modelled at R2.

Table 2-1: Predicted Noise at Sensitive Receptors

Receiver	Assigned Level dB(A)	Predicted Levels dB(A)	
		Fixed Plant Only	Fixed Plant and Mobile Equipment
R1	60	40.3	41.1
R2	35	34.9	35.1
R3	35	25.2	25.3
R4	35	20.8	29.2
R5	35	9.3	12.3
R6	35	16.4	19.8
R9	35	28.9	33.1
R10	35	14.9	19.5
R11	35	13.3	16.6

Further detail on noise received at R2 is provided in Table 2-2. Noise from fixed plant only is expected to result in a noise level of 34.9 dB(A) under worst-case conditions at nighttime. Noise from fixed and mobile equipment is expected to result in a noise level of 35.1 dB(A). Alcoa notes that:

- Noise from all sources is compliant with assigned levels during the day and in the evening without any management intervention.
- The noise model assumes:
    - Worst-case meteorological conditions at nighttime.
    - That equipment is operating at the locations in the mine plan that are closest to R2.
- Compliance under worst-case conditions at nighttime can be achieved by managing mobile equipment locations and movements during these times.
- The Nexus noise system provides real-time predictive modelling of noise at receptors and is utilised to inform mining activities during high risk periods which have potential to impact noise sensitive receptors.

Table 2-2: Noise Contribution at R2

Source	Contribution dB(A)	Assigned Level (dB(A)		
		Day	Evening[1]	Night
CV371	31.5	-	-	-
CV374	29.0	-	-	-
Arundel Transfer Station	28.4	-	-	-
CV371 Drive	22.1	-	-	-
Larego 360 Crusher	13.8	-	-	-
Total Fixed Sources	**34.9**	**45.0**	**40.0**	**35.0**
Mobile Equipment	21.3	-	-	-
Total All Sources	**35.1**	**45.0**	**40.0**	**35.0**

[1]Level applies in the evening, Sundays and Public Holidays

2.4 Proposed Amendment

The sealing of gaps at the Arundel Transfer Station has been completed and, with the change in status of R1, completion of the Noise Mitigation Works via construction of the Noise Enclosure is not required to ensure that noise at receptors complies with the assigned levels in the Noise Regulations. Alcoa proposes that:

- The Noise Mitigation Works in Table 1 of condition 1 are removed.
- The compliance and reporting requirements in Conditions 6 to 9 are removed.

3. Review of Pipeline and Drainage Routes

3.1 Arundel Area

Alcoa has reviewed the pipeline routes in the Arundel area. The routes presented in the Licence Figures 8[1] and 9 do not fully align with the as-constructed routes:

- Supply line to APTD001 & 002, from AP4 to APTD001 & APTD002. This pipeline was constructed in existing easements in accordance with licence conditions. Alcoa requests the figures in the licence be updated to match the as constructed route provided in the compliance assessment report submitted to DWER on 14/02/2025.
- Untreated Water (Hydrocarbon). The alignment of this existing pipeline depicted in the Licence figures does not accurately reflect the as constructed alignment. Alcoa requests the figures in the Licence be amended to more accurately reflect the actual route.

The following routes have also been changed based on the proposed new location of ASW3 (See Section 4.1).

- The section of Supply line to APTD001 & 002 from ASW3 to APTD001 & 002 is proposed to be removed as it no longer leads to the proposed location of the ASW3.
- The route of the Treated Water (Hydrocarbon Removed) Pipeline, from AP1 to ASW3 has been adjusted to the new location of ASW3.

For completeness, Alcoa also proposes that the following existing routes are shown on the licence figures:

- The pipeline that passively flows from AP1 to AP2.
- The drain that flows from AP1 and ASW2 to AP3.

Note that this pipeline and drain:

- Are in the same corridor as the Supply line to APTD001 & 002 and are shown as offset in figures.
- Will both be disconnected once Ponds ASW3 and ASP3 are constructed (See Section 4).

The changes from the existing licence figures are shown in Figure 3-1. Note that the added and corrected routes are shown in all other figures, including the amended figures for the licence (See Section 7).

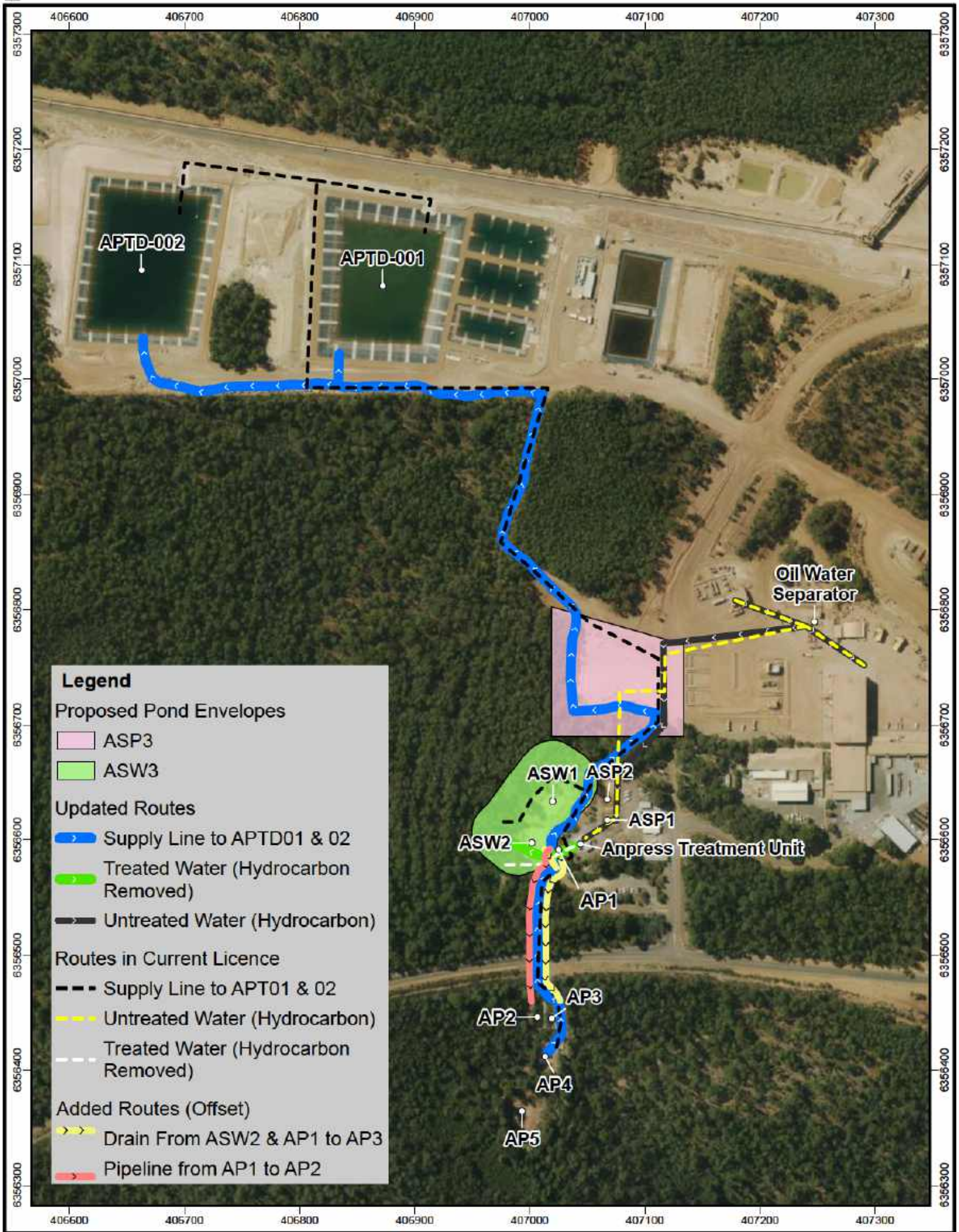
[1] The PFAS Affected Water Pipeline shown on Figure 2 of the existing licence shows a different route for the Supply line to APTD001 & 002 shown on Figure 8. The changes assessed are the changes from Figure 8 of the existing licence.

3.2 Orion Area

Figure 7 of the existing licence shows an indicative catchment area for Orion Sumps 1 – 3. This catchment can be updated to match the drainage assessment for the site. The proposed change is shown on Figure 3-2 and has been included in the amended figures for the licence (See Section 7).

3.3 Larego Area

Figure 11 and Figure 12 of the licence show stormwater and treated water at Larego being directed further east than is the case. Alcoa proposes that a shorter route is shown on the figures. The proposed change is shown on Figure 3-3 and has been included in the amended figures for the licence (See Section 7).



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m

Scale: 1:4,000

AGD 1984 AMG Zone 50

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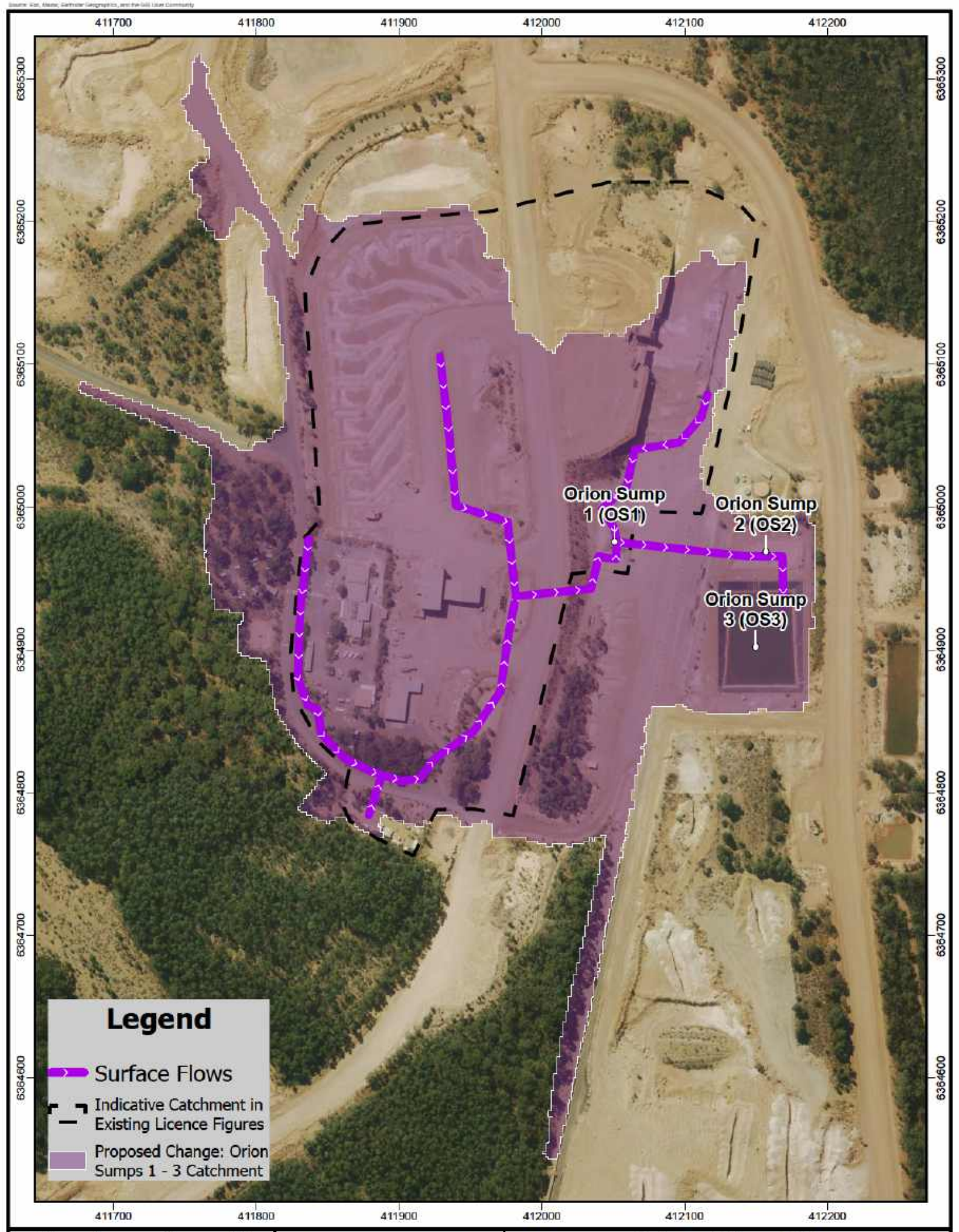
Figure 3-1 Updates to Arundel Area

Drawing #: Figure 3-1 Arundel Updates			Author: smita
Date: 19/09/2025	Rev: A	A4	Date Printed: 19/09/2025

Path: L:\users\EApprovals\EA1P0049\Projects\EA1P0049\EA1P0049.aprx



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Metres

Scale: 1:3,200

AGD 1984 AMG Zone 50

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Environmental Licence L6465

Figure 3-2 Updates to Orion Area

Drawing #: Figure 3-2 Orion Updates			Author: smita
Date: 19/09/2025	Rev: A	A4	Date Printed: 19/09/2025

Path: L:\users\EApprovals\EA1P0049\Projects\EA1P0049\EA1P0049.aprx

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Scale: 1:2,000

AGD 1984 AMG Zone 50

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Environmental Licence L6465

Figure 3-3 Updates to Larego Area

Drawing #: Figure 3-3 Larego Updates			Author: smita
Date: 19/09/2025	Rev: A	A4	Date Printed: 19/09/2025

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4. Proposed Changes to Arundel Ponds

Table 1 of Condition 1 approves construction of the following two ponds at Arundel:

- Arundel Workshop and stormwater collection pond (ASW3).
- Anpress-pretreatment sump (ASP3).

The purpose of these ponds is to capture potentially contaminated stormwater and prevent discharge into the environment.

4.1 Arundel Stormwater Pond 3 (ASW3)

L6465/1989/10 approves ASW3, which is an additional pond that will collect and hold surface water run-off which can then be pumped to the pre-treatment dams (APTD-01 and APTD-02) at the PFAS Treatment Unit (PTU) for subsequent treatment. Alcoa proposes the following changes to ASW3:

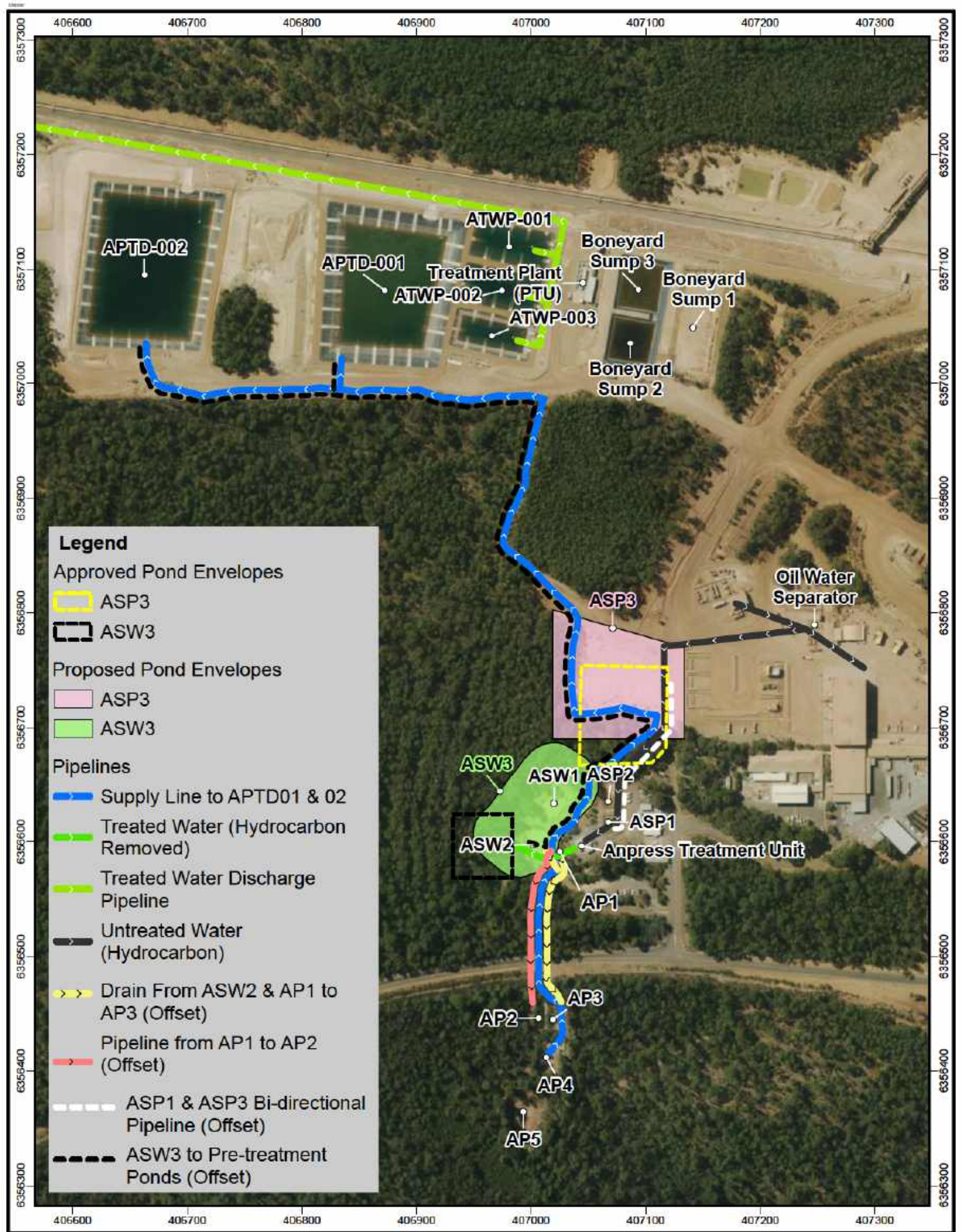
- Change in location.
- Increase in capacity from 1.5 ML to 3 ML.

Existing ponds at Arundel and the proposed changes in location of ASW3 are shown in Figure 4-1. The changes are shown at a closer extent in Figure 4-2. These new locations have been included in the proposed revised figures for the licence (Section 7). At the proposed new location, ASW3 will incorporate and replace the existing, unlined ponds ASW1 and ASW2. The increase in capacity compensates for the loss of ASW1 (0.26 ML) and ASW2 (1.1 ML).

Apart from the location and increase in capacity, the proposed ASW3 meets the requirements of the existing licence. It will be constructed with a clay and a high density polyethene (HDPE) liner to a minimum permeability of 1×10^{-9} m/s. Design criteria for the proposed new pond are provided in Table 4-1.

A double-skinned HDPE pipeline will be constructed between ASW3 and the PTU Pre-treatment ponds (APTD-001 and APTD-002 in accordance with Condition 1 of the existing licence. The pipeline route is shown on Figure 4-1 and has been included in the amended figures for the licence (See Section 7).

Alcoa considers that the proposed changes do not increase environmental risks at the Prescribed Premises, and considers this design change a risk reduction as it removes the existing unlined ponds and replaces them with a composite lined pond which provides greater risk mitigation for potential contamination.



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Scale: 1:4,000

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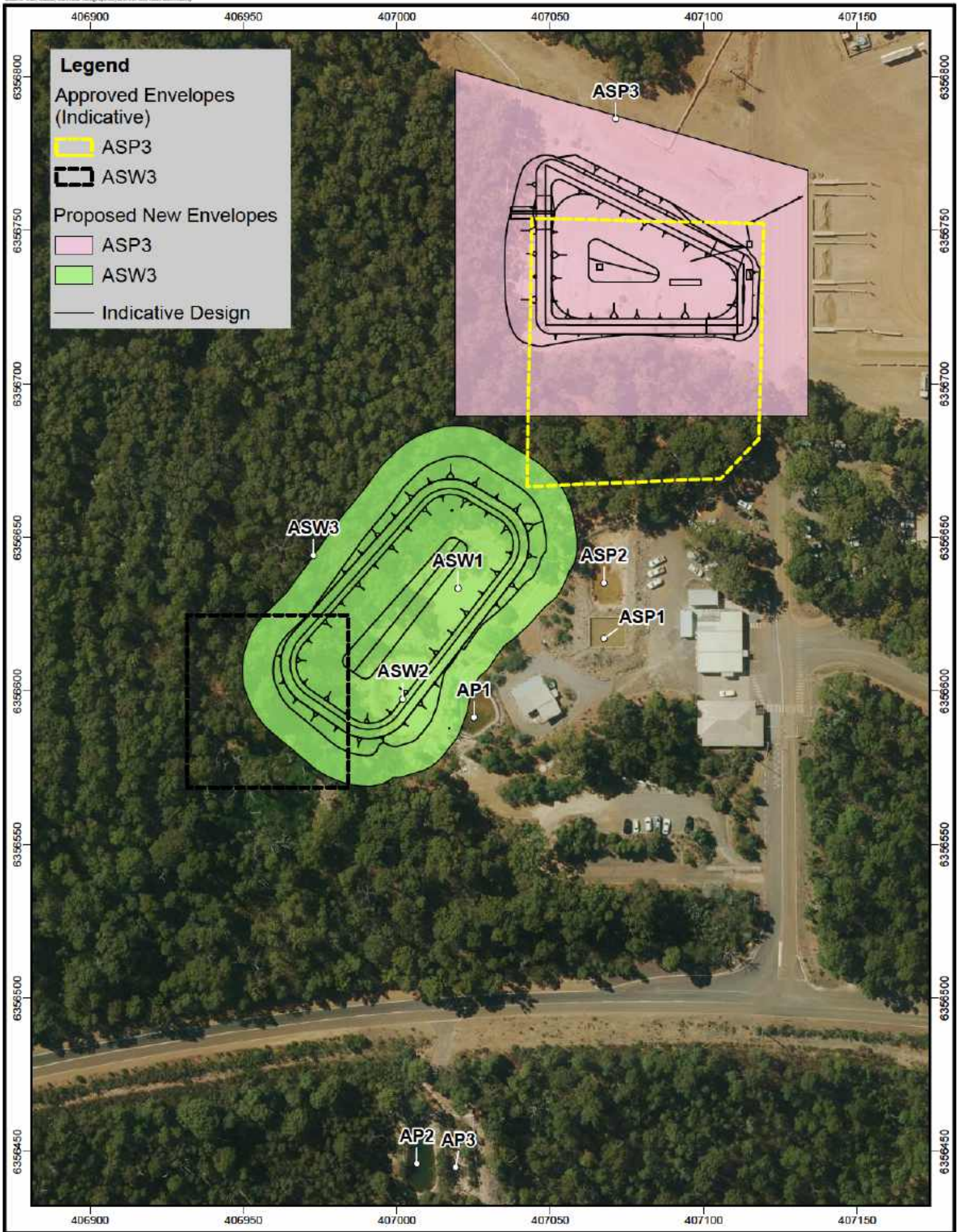
Figure 4-1 Arundel Ponds

Drawing #: Figure 4-1 Arundel Ponds			Author: smita
Date: 19/09/2025	Rev: A	A4	Date Printed: 19/09/2025

Path: L:\users\EApprovals\EA1P0049\Projects\EA1P0049\EA1P0049.aprx



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Metres

Scale: 1:1,500

AGD 1984 AMG Zone 50

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Figure 4-2 Proposed Changes to ASW3 and ASP3

Drawing #: Figure 4-2 Arundel Pond Changes			Author: smita
Date: 19/09/2025	Rev: A	A4	Date Printed: 19/09/2025

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Table 4-1: Design Basis of ASW3

Aspect	Design Criteria
Design Life	• 20 years
Capacity	• 3 ML
Embankment Failure Consequence Category	• High C
Environmental Spill Consequence Category	• High C
Embankment Stability (Minimum Factor of Safety Required)	• Long Term: 1.5 • Short Term: 1.3 • Post Seismic: 1.1
Seismicity	• Operating Basis Earthquake - 1: 475 AEP: PGA 0.07g
Design rainfall events and intensities for 72- hour period	• 1: 100 AEP 72hrs: 231 mm
Operating freeboard	• 1,000 mm below spillway invert
Liner System	• Permeability: no more than 10^{-9} m/s • Composite liner: Clay or Geosynthetic Clay Liner and HDPE.
Spillway	• Provided.
Abstraction System	• Pontoon mounted pump system or turret abstraction system.

4.2 Anpress Pre-treatment Sump (ASP3)

Oily water from Arundel Workshops is currently passed through an oil water separator before being directed to the Anpress pretreatment sumps (ASP1 and ASP2). This water is treated in the Anpress plant before being directed into Ponds AP1 to AP4. A pump in AP4 conveys the water to the Pre-Treatment Dams (APTD-001 & 002) for subsequent treatment via the PTU. An additional pond, Anpress Pre-treatment Sump 3 (ASP3), was approved to provide additional storage capacity prior to treatment in the Anpress.

Alcoa has identified that a change in the currently approved location of ASP3 will allow construction to progress with limited additional clearing of remnant native vegetation. The proposed change in location is shown in Figure 4-2.

As part of the design change a bi-directional, double skinned HDPE pipeline will be installed inside existing easements between ASP3 and ASP1. The route is shown on Figure 4-1. This pipeline will facilitate two way flow to manage storage capacities in the ponds.

The proposed change in location and the bi-directional pipeline have been included in the proposed new figures for the licence (See Section 7).

No change to capacity is proposed. The design basis of the proposed pond is in Table 4-2. Alcoa considers that the proposed changes do not affect environmental risk at the Prescribed Premises.

Table 4-2: Design Basis of ASP3

Aspect	Design Criteria
Design Life	• 20 years
Capacity	• 1.5 ML
Embankment Failure Consequence Category	• High C
Environmental Spill Consequence Category	• High C
Embankment Stability (Minimum Factor of Safety Required)	• Long Term: 1.5 • Short Term: 1.3 • Post Seismic: 1.1
Seismicity	• Operating Basis Earthquake - 1: 475 AEP; PGA 0.07g
Design rainfall events and intensities for 72- hour period	• 1: 100 AEP : 231 mm
Operating Freeboard	• 1000 mm below spillway invert
Liner System	• Permeability: no more than 10^{-9} m/s • Composite liner: Clay or Geosynthetic Clay Liner and HDPE.
Spillway	• Provided.
Abstraction System	• Pontoon mounted pump system or turret abstraction system

4.3 Proposed Amendment to Condition 1

Construction of ASW1 and ASP3 is approved via Condition 1. Proposed amendments are below.

Note that Alcoa has provided a revised set of figures as part of this licence amendment application (See Section 7). The proposed new locations of ASW1 and ASP3 are included in Figure 2 of the proposed new figures.

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**
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~~ no less than 3 ML; and • Clay liner and HDPE liner to meet maximum permeability of 1 x 10^{-9} m/s.	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
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) • Double-skinned, HDPE pipeline between ASP3 and ASP1 to be constructed inside existing easements.	Arundel infrastructure and equipment as shown in ~~Figure 8~~ Figure 2 of Schedule 1~~: Arundle site layout and drainage plan~~	

5. Sampling of Arundel Treated Water Ponds

Condition 26 sets sampling requirements for the Arundel Treated Water Ponds prior to each discharge event to McKnoes Brook. The averaging period specified in Table 14 stipulates that a composite sample is taken, with the footnote specifying that this is scheduled for every 0.5 ML of treated water.

The licence does not provide for spot sampling and, in the event of autosampler failure, water currently cannot be discharged in accordance with the licence conditions. To comply with the current condition, Alcoa must retreat water for the express purpose of obtaining a composite sample from the autosampler as per the condition requirements. This results in the unnecessary retreatment of water which already meets the discharge criteria. Failure of the autosampler may be due to malfunction or contamination.

To avoid unnecessary retreatment, Alcoa proposes that an additional footnote is added to Table 13 to allow direct spot sampling of the ponds in the event of autosampler failure.

Note 4: In the event of autosampler failure, a spot sample must be taken from the pond with water to be discharged. The sample must comply with discharge criteria.

As sampling is still required, and the spot sample must comply with discharge criteria, Alcoa considers that this change does not affect the environmental risks associated with the discharge of treated water.

6. Removal of Completed Conditions

6.1 Completed Items in Table 1

Condition 1 of L6465/1989/10 approves construction and commissioning of infrastructure at Willowdale. The infrastructure in Table 6-1 has been constructed and commissioned and can be removed from Table 1 of Condition 1.

Table 6-1: Constructed Infrastructure to be Removed from Table 1

Infrastructure	Commissioned	Compliance Report Submitted
PFAS Treatment Unit (PTU)	31/01/2025	28/02/2025
McKnoes Brook water level monitoring device	24/09/2024	23/10/2024

6.2 Partially Completed Rows in Table 1

Row 3 of Table 1 approves pipelines from Arundel mining area to PTU, and from PTU to McKnoes Brook discharge point. Existing pipelines to the PTU and to McKnoes Brook were commissioned on 15 January 2025 and the compliance report submitted to DWER on 14 February 2025. Flowmeters recording the volumes treated and discharged have also been installed.

The pipeline from ASW3 to the PTU still needs to constructed (See Section 4.1); however references to the pipeline to McKnoes Brook can be removed. A proposed amendment to Condition 1 is below.

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**
Pipelines from Arundel mining area to PTU, ~~and from PTU to McKnoes Brook discharge point~~	*~~• Pipelines from PTU to McKnoes brook discharge point to have:~~* *~~-Capacity of 72 m³/hour~~* *~~-125 mm diameter HDPE pipelines; and~~* *~~-be installed above ground, and 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~~*	*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*

6.3 PTU Commissioning Conditions

Conditions 4 and 5 set specific commissioning conditions for the PFAS Treatment Unit (PTU). These have been completed. The commissioning report for the PTU was submitted to DWER on 28/02/2025.

Alcoa requests that:

- The infrastructure in Table 6-1 is removed from Table 1 of L6465/1989/10.
- Condition 4 and Condition 5 are removed.

7. Consolidation of Figures in Schedule 1

Schedule 1 of the licence contains 14 figures:

- Some show similar information.
- Figure 13 is not referenced in the licence text.
- Figure 3 and Figure 4 are no longer required.

Alcoa has reviewed all references to figures in the licence and proposes that Schedule 1 of the licence is replaced with the seven figures in Appendix 2. Table 7-1 documents each time a figure is referenced in the licence and the proposed new figure referenced.

Note that the changes to the pipeline routes and drains described in Section 3 and the proposed changes to the Arundel Ponds in Section 4 have been incorporated into the proposed revised figures.

This change is administrative and does not impact environmental risks at the Prescribed Premises.

Table 7-1: Proposed References to Figures

Location	Item referenced	New Figure
Table 1	PFAS Treatment Unit	Figure 2*
Table 1	Arundel Mining Area	Figure 3
Table 1	Arundel Infrastructure and equipment	Figure 2
Table 1	Conveyor 371 Enclosure	Not shown*
Table 3	Arundel Treated Water Ponds 1, 2 and 3 (ATWP-001, ATWP-002 and ATWP-003) sample points	Figure 2*
Condition 6(a)	Noise Receptor R1	Figure 4*
Table 6	Larego 360 Crusher	Figure 5
Table 6	Larego Water storage reservoir	Figure 5
Table 6	Larego Wastewater Storage Ponds (Oily water pond and DAF holding sump)	Figure 6
Table 6	Larego Dissolved Air Floatation (DAF) Water Treatment	Figure 6
Table 6	Larego Stormwater management	Figure 5
Table 6	Arundel 371/374 transfer station	Figure 4
Table 6	371 and 374 Conveyors	Figure 4
Table 6	Arundel Pre-treatment dams APTD-001 and APTD-002	Figure 2
Table 6	PTU	Figure 2
Table 6	PTU Treated Water Dams	Figure 2
Table 6	Pipelines	Figure 3 & Figure 2
Table 6	Orion Sumps 1, 2 and 3	Figure 7
Table 7	Dams and sumps at Orion, Arundel and Larego	Figure 2 & Figure 5 & Figure 7

Location	Item referenced	New Figure
Table 7	Arundel Pre-treatment dams APTD-001 and APTD-002	Figure 2
Table 7	All pipelines connected to the PTU	Figure 2 & Figure 3
Table 7	Larego Water Storage Reservoir	Figure 5
Table 7	DAF Water Treatment Facility pipelines and bunding	Figure 6
Table 7	McKnoes Brook discharge point	Figure 3
Table 8	McKnoes Brook	Figure 3
Table 8	Flinders C Sump or Larego Water Storage Reservoir	Figure 5
Table 9	McKnoes Brook	Figure 3
Table 10	sample locations from Arundel Treated Water Ponds 1, 2 and 3 (ATWP-001, ATWP-002 and ATWP-003) sample points	Figure 2
Table 10	discharge from DAF Treated Water Ponds 1, 2 and 3	Figure 6
Table 12	Orion wastewater sump No. 3 (OS3)	Figure 7
Table 12	Arundel wastewater sump No. 4 (AP4)	Figure 2
Table 12	Arundel Pre-Treatment Dams 1 (APTD-001) and 2 (APTD-002)	Figure 2
Table 13	Arundel Treated Water Ponds 1, 2 and 3 (ATWP-001, ATWP-002 and ATWP-003)	Figure 2
Table 14	Monitoring point reference	Figure 6
Table 15	Assessment of vegetation health along four transects	Figure 3
Table 16	McKnoes Brook Surface water sampling locations	Figure 3
Table 16	McKnoes Brook water level monitoring device	Figure 3
Table 17	Monitoring point reference	Figure 3
Table 19	APTD-001 and APTD-002	Figure 3
Table 19	Arundel mining area infrastructure	Figure 1
Table 19	premises	Figure 1
Table 19	PTU	Figure 2

*Reference is in condition proposed to be removed

8. Other Administrative Clarifications

Two other administrative clarifications are proposed in Table 8-1. These are administrative and have no impact on environmental regulation or risk.

Table 8-1: Proposed Clarifying Amendments

Location	Amendment	Justification
Table 6, Row 10, Column 1	*PTU Treated Water ~~Dams 1, 2 and 3~~ Ponds ATWP-001, ATWP-002 and ATWP-003*	Consistency of names for these ponds on figures and in rest of licence.
Table 14, Row 1, Column 1	*Larego DAF Treated Water ~~Storage~~ Ponds 1, 2 and 3*	Consistency of names for these ponds on figures and rest of licence.

9. References

Wood. (2025). *Alcoa Willowdale CV371 Noise Assessment AU02989-FN02-rev-1.* Perth: Wood PLC.

Appendix 1: Noise Assessment

Title:	Alcoa Willowdale CV371 Noise Assessment		
Project:	Alcoa Willowdale CV371 Noise Assessment		
Client:	Alcoa		
Wood Doc No	AU02989-FN02-rev-1	**Wood Job No.**	AU02989

Revision	Description	Prepared	Reviewed	Date
A	Issue for Review	RG	AS	02/09/2025
0	Issue for Use	RG	AS	08/09/2025
1	Issue for Use	RG	AS	19/09/2025

1. INTRODUCTION

Alcoa's Willowdale mining operations are subject to the conditions outlined in the Environmental Licence (the Licence). Wood has previously supported Alcoa's License by undertaking a noise control assessment[1] of Conveyor 371 (CV371) and the Arundel Transfer Station. Historic noise monitoring/modelling has demonstrated that fixed-infrastructure noise sources (primarily the overland conveyor CV371 and Arundel Transfer Station) contribute to a non-compliance of the Assigned Levels at noise-sensitive receptor (NSR) R1.

The License conditions stipulate requirements to attenuate noise emissions from CV371 and the Arundel Transfer Station. Noise mitigation works, required by the 31st of December 2025, are:

- Installation of an acoustic enclosure over a 2.5 km section of CV371; and
- The sealing of gaps between acoustic panels on the upper floor of the Arundel Transfer Station.

The majority of gaps in the transfer station façades were sealed by November 2021 and field measurements verified a noise emission reduction of 8 dB(A). Remaining gaps noted during this field assessment were sealed by December 2021. The 2.5 km noise enclosure around CV371 has not been installed.

Wood previously supported Alcoa in investigating an alternative option of installing a 3 m tall noise barrier approximately 1 m from the northern side of CV371 over a 2.7 km span[2]. This study presents the last iteration of the noise model; however, the option of a noise barrier was not pursued.

[1] *Refer to Willowdale Mine Noise Compliance Verification Assessment - Larego Crusher Relocation and Mining AU00077-1-100-Rev0-27.May.2021*

[2] *Refer to Willowdale CV371 Noise Control Assessment AU02989-FN01-Rev-0-10-04-2025*

NSR R1 no longer meets the definition of a *noise sensitive premises: highly sensitive* defined in the *Environmental Protection (Noise) Regulation 1997* (the Regulations) and is no longer a property for residential purposes. The property remains as a *noise sensitive premises* and thus an Assigned Level of 60 dB(A) is applicable to this receiver. As such, Alcoa is seeking a license amendment application to remove noise mitigation requirements.

1.1 Scope of this Study

The scope of this study is to determine whether noise mitigation works are required to achieve compliance with the Assigned Levels for all NSRs within the Arundel (R1) and Larego region (R2-R11[3]). Updates to the existing Willowdale mine noise model will reflect the existing (current) configuration and predict the noise levels at all NSRs.

This report summarises the modelling methodology and results of the noise assessment.

[3] R7 & R8 have not been modelled as part of this assessment given their distant proximity to the Larego operations

2. MODELLING METHODOLOGY

The existing Willowdale mine 3D acoustic model has been updated to predict the received noise levels at selected NSRs without the implementation of noise mitigation works.

The modelling scenario considered for this assessment is based on Scenario 2 from the historic Larego Crusher Relocation Verification Assessment and remains mostly unchanged. This scenario is representative of the high-risk activities for night-time operations near R1, modelled under downwind conditions to all Arundel and Larego NRSs. Mining activities are assumed to be occurring in the northwestern pits (BLAXLAND-15) and near the crushing plant of the Larego mine. The noise modelling methodology applied for this assessment, including equipment sound power levels, meteorological conditions, and general assumptions/limitations are consistent with the previous study.

The following additional assumptions have been considered for the noise control assessment:

- The existing corrugated metal noise wall which previously coincided with the proposed 3 m high wall on the northern side of CV371, is reimplemented into the acoustic model to reflect the current configuration;
- The previously modelled 3 m high wall as an alternative to the noise enclosure has been removed from the acoustic model;
- The 2.5 km noise enclosure, required under the Environmental Licence, has not been included in the acoustic model;
- An 8 dB(A) reduction in sound emission, verified through field measurements following the sealing of gaps in acoustic panels at the Arundel Transfer Station, has been included the acoustic model;
- The addition reduction achieved by sealing the remaining gaps at the Arundel Transfer Station, completed following the field assessment in November 2021, has not been included in the acoustic model; and
- Wind direction is modelled downwind to all NSRs for worst-case conditions. The previous assessment considered southerly winds as realistic worst-case wind conditions for predicted noise levels at R1.

3. RESULTS & DISCUSSION

The following sections summarise the results of the modelled outputs.

3.1 Modelled Predictions at Noise-Sensitive Receptors

Predicted noise levels for fixed equipment during night-time operations are presented in Table 3-1. This table indicates the overall noise contribution of the overland conveyors CV371 & CV374, Arundel Transfer Station, Crusher Plant, and the Orion CV371 Drive. The noise contribution of mobile equipment has been excluded.

Table 3-1: Worst-case Predicted Noise Levels at NSRs – Fixed Plant Equipment

Receiver	Predicted Level dB(A)	Assigned Level dB(A)	Difference dB(A)	Compliance
R1	40.3	60	-19.7	Compliant
R2	34.9	35	-0.1	Compliant
R3	25.2	35	-9.8	Compliant
R4	20.8	35	-14.2	Compliant
R5	9.3	35	-25.7	Compliant
R6	16.4	35	-18.6	Compliant
R9	28.9	35	-6.1	Compliant
R10	14.9	35	-20.1	Compliant
R11	13.3	35	-21.7	Compliant

Table 3-2 outlines the predicted noise levels for night-time operations inclusive of mobile equipment activity. Entries in bold **red** text indicates the receivers at which the Assigned Levels may be exceeded. A noise contour of the modelled scenario is provided in Appendix A.

Table 3-2: Worst-case Predicted Noise Levels at NSRs – Fixed Plant & Mobile Equipment

Receiver	Predicted Level dB(A)	Assigned Level dB(A)	Difference dB(A)	Compliance
R1	41.1	60	-18.9	Compliant
R2	**35.1**	35	+0.1	Borderline non-compliance
R3	25.3	35	-8.9	Compliant
R4	29.2	35	-11.2	Compliant
R5	12.3	35	-22.7	Compliant
R6	19.8	35	-15.6	Compliant
R9	33.1	35	-1.9	Compliant
R10	19.5	35	-15.7	Compliant
R11	16.6	35	-18.4	Compliant

Table 3-3 provides a ranking of predicted noise source contributions at receptors R1 and R2. Entries in bold **black** text indicate the noise contribution of CV371 and the Arundel Transfer Station.

Table 3-3: Source Contribution Breakdown for Receptor R1 & R2

Source	Predicted Noise Level Contribution (dBA)	
	R1	R2
CV371	**38.3**	**31.5**
Arundel Transfer Station	**32.8**	**28.4**
Mobile Equipment	33.5	21.3
CV374	31.3	29.0
CV371 Drive	27.9	22.1
Larego 360 Crusher	9.2	13.8
All Sources	41.1	35.1
All Fixed Plant Equipment Sources (Excluding Mobile Equipment)	40.3	34.9

Modelling has demonstrated that compliance may be achieved at all NSRs without the implementation of noise mitigation works on fixed plant. Noise levels at the closest residential receptor (R2) are predicted to be 34.9 dB(A) which is below the Assigned Levels for this receiver.

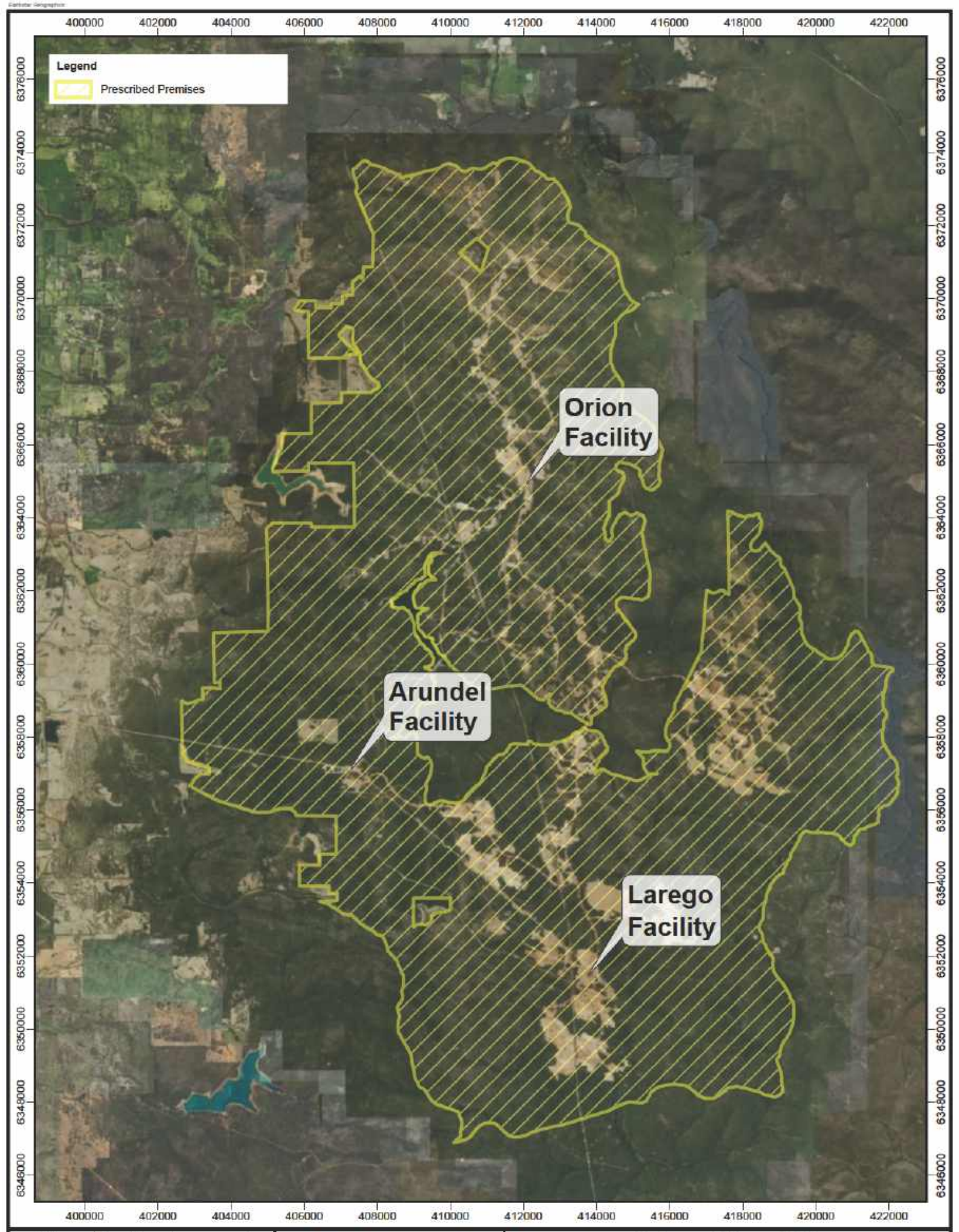
Noise contribution from mining equipment in the northwestern pits and at the crushing plant predict an exceedance at R2. It should also be noted that the modelling has been undertaken assuming worst-case wind conditions (downwind from all noise sources to all receptors) which, given the location of the various sources, is conservative. The risk of exceedance is dependent upon the location of the mining equipment which is currently modelled in a worst-case location close to R1 and R2.

4. CONCLUSION

The modelling represents high-risk operational activities for night-time operations near R1, with downwind conditions to all receptors to form the basis of a worst-case assessment. The results of the noise assessment demonstrate that the predicted noise levels of CV371 and the Arundel Transfer station without the implementation of noise mitigation works does not exceed the Assigned Levels at all NSRs. As such, the noise mitigation works are not required to achieve compliance with Assigned Levels at all sensitive receivers. Whilst the noise emission levels of fixed plant equipment are anticipated to be compliant, the noise impact of mobile equipment activity may cause night-time exceedance depending on their proximity, primarily at R2. Alcoa should continue to monitor mobile equipment noise using operational management strategies (e.g. Nexus).

APPENDIX A : NOISE CONTOUR MAP OF MODELLED SCENARIO

Appendix 2: Proposed New Figures



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AGD 1984 AMG Zone 50

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Figure 1 Prescribed Premises

Drawing #: Figure 1 Prescribed Premises			Author: smita
Date: 19/09/2025	Rev: A	A4	Date Printed: 19/09/2025

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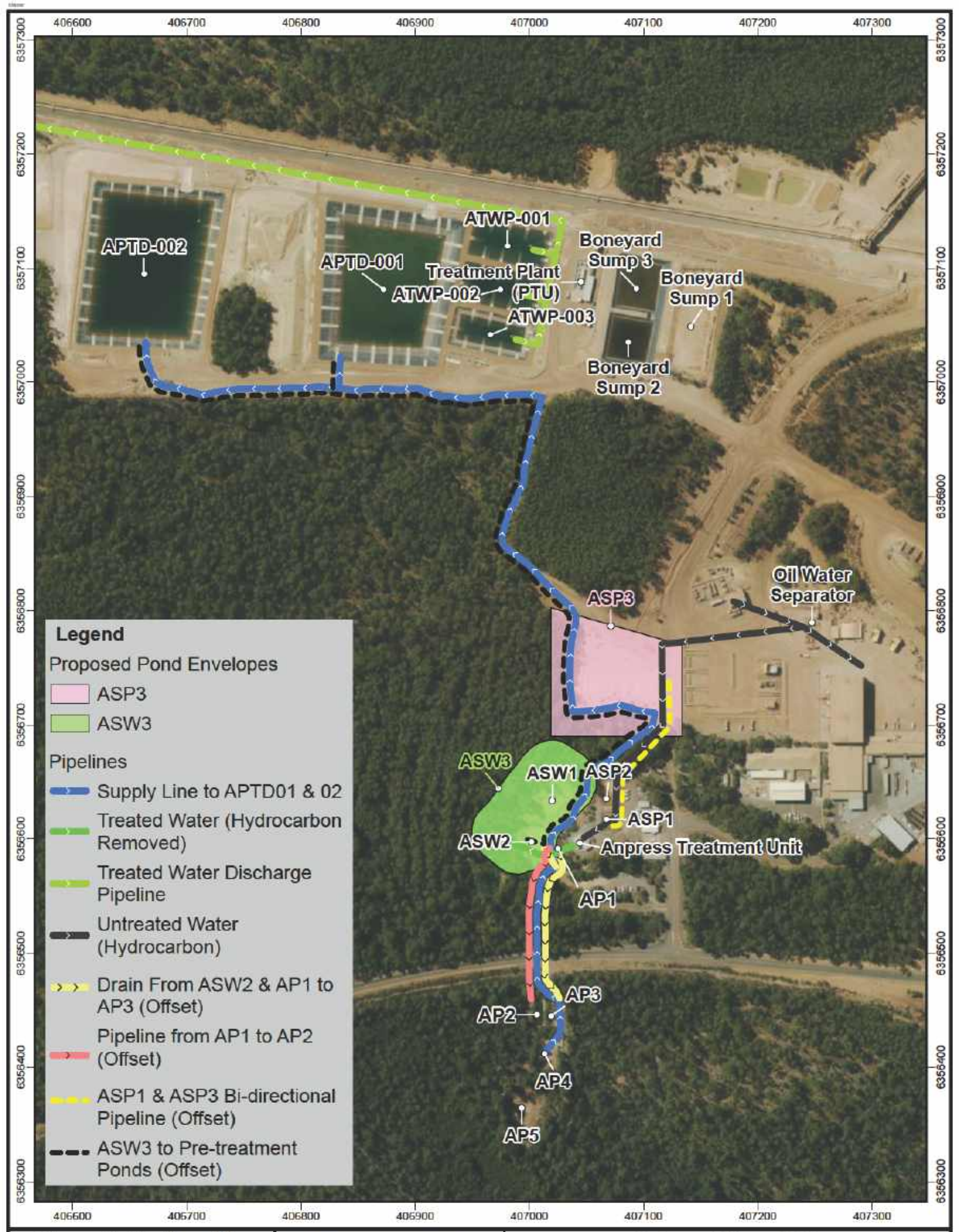

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AGD 1984 AMG Zone 50

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Figure 2 Arundel Infrastructure

Drawing #: Figure 2 Arundel Infrastructure			Author: smita
Date: 19/09/2025	Rev: A	A4	Date Printed: 19/09/2025

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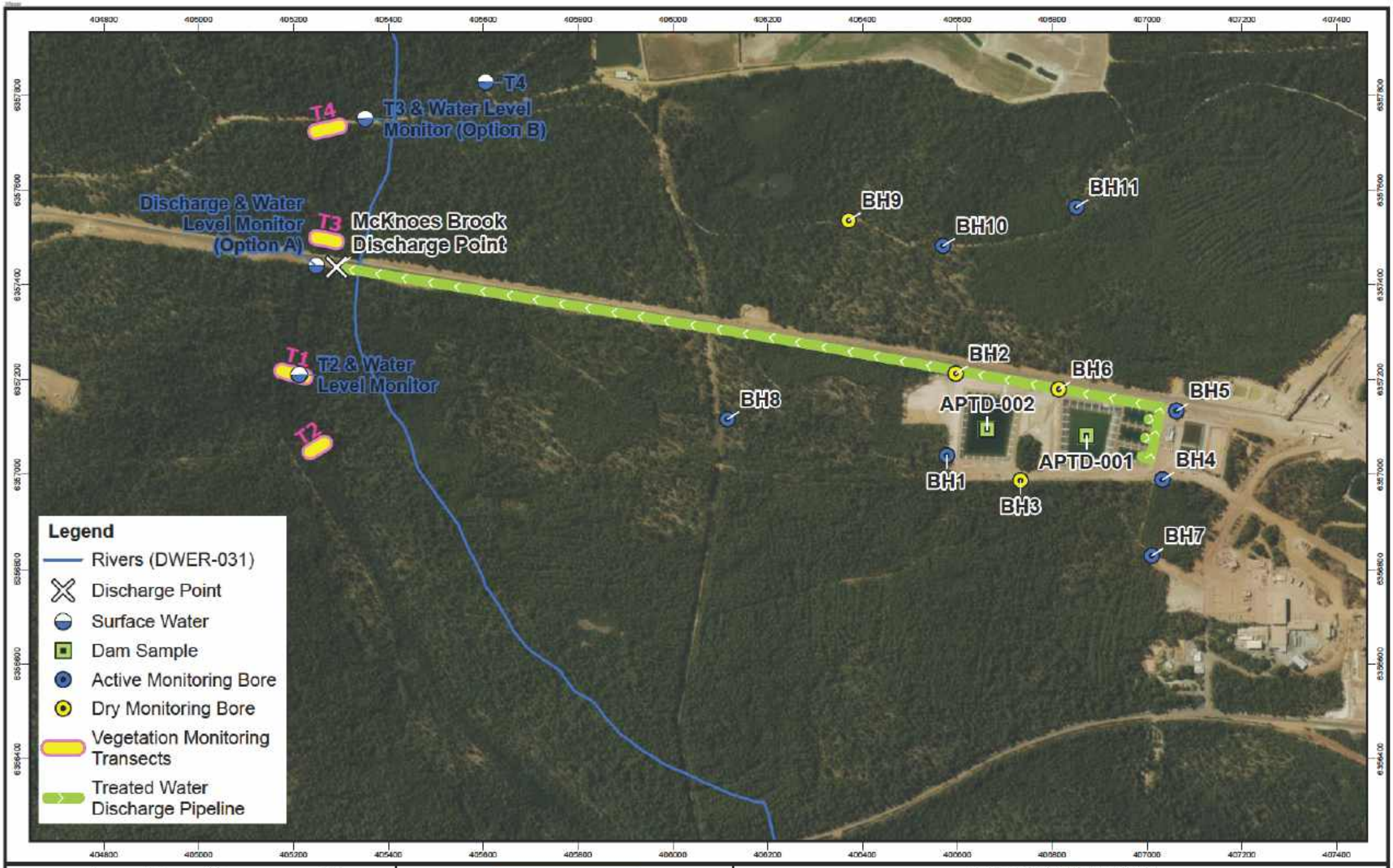

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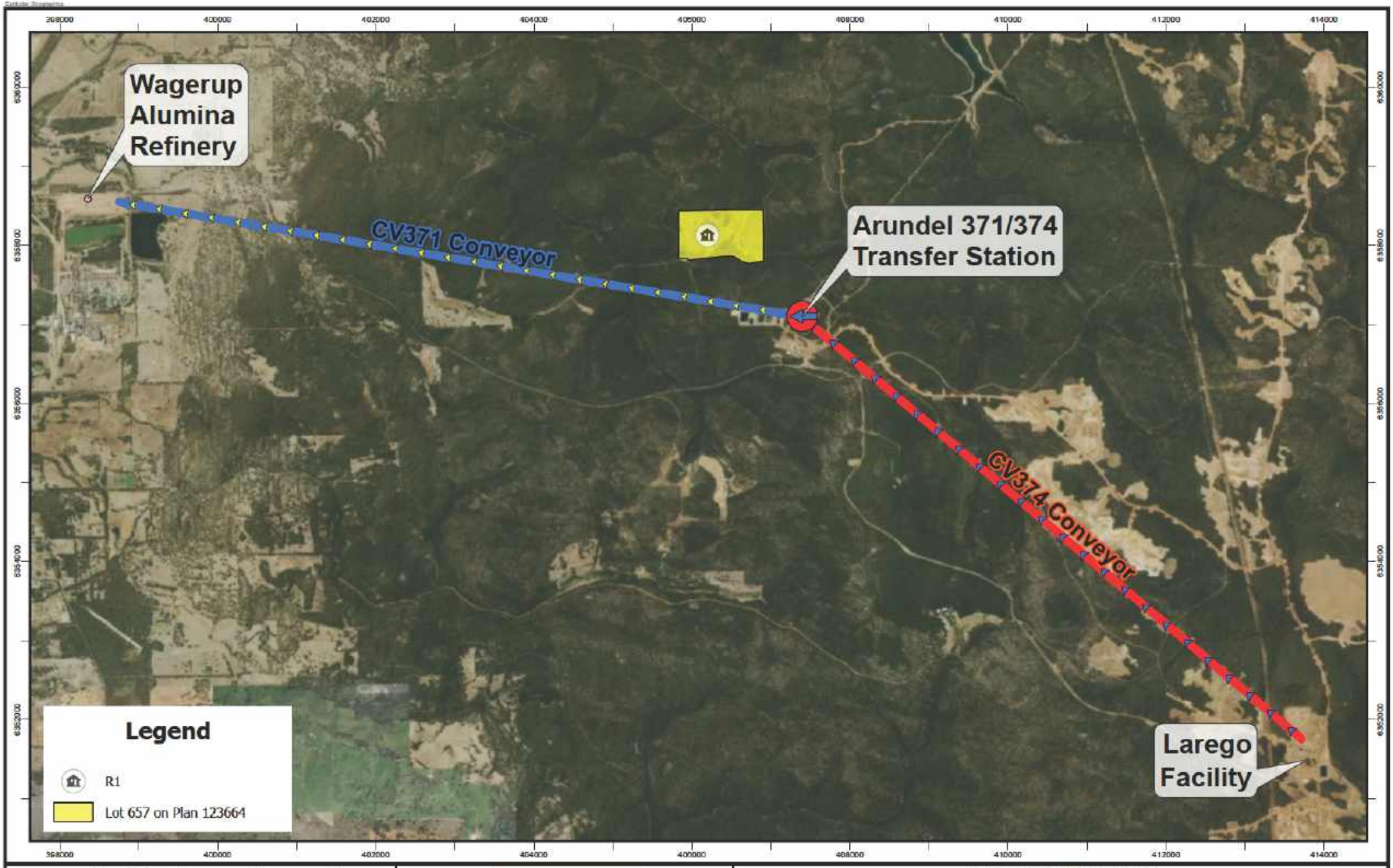
Figure 3 Arundel Monitoring

Drawing #: Figure 3 Arundel Monitoring

Author: smita

Date: 19/09/2025 | Rev: A | A4 | Date Printed: 19/09/2025



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AGD 1984 AMG Zone 50

Alcoa

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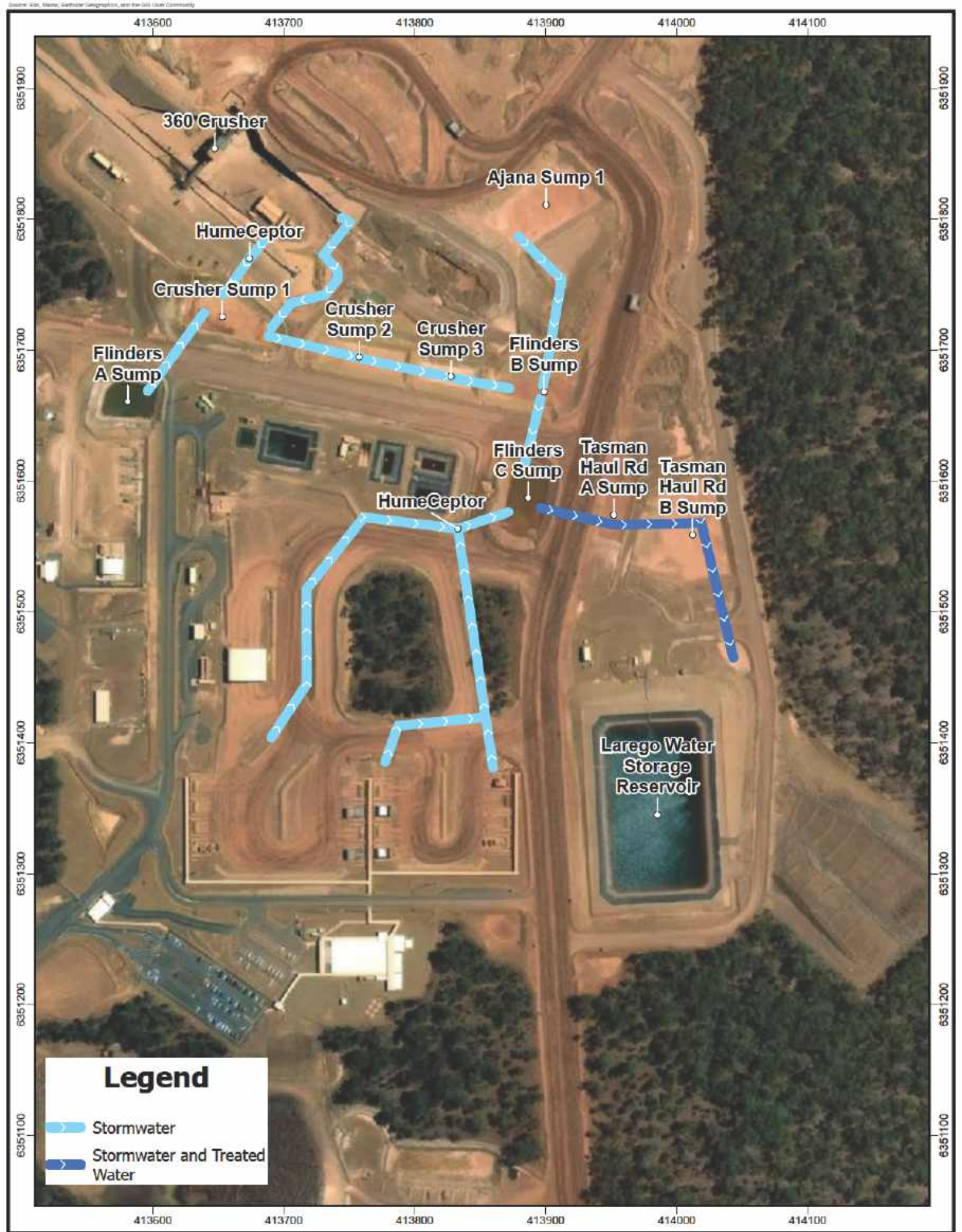
Figure 4 Willowdale Conveyors

Drawing #: Figure 4 Willowdale Conveyors

Author: smita

Date: 19/09/2025 | Rev: A | A4 | Date Printed: 19/09/2025



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AGD 1984 AMG Zone 50

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Figure 5 Larego Infrastructure

Drawing #: Figure 5 Larego Infrastructure			Author: smita
Date: 24/09/2025	Rev: A	A4	Date Printed: 24/09/2025

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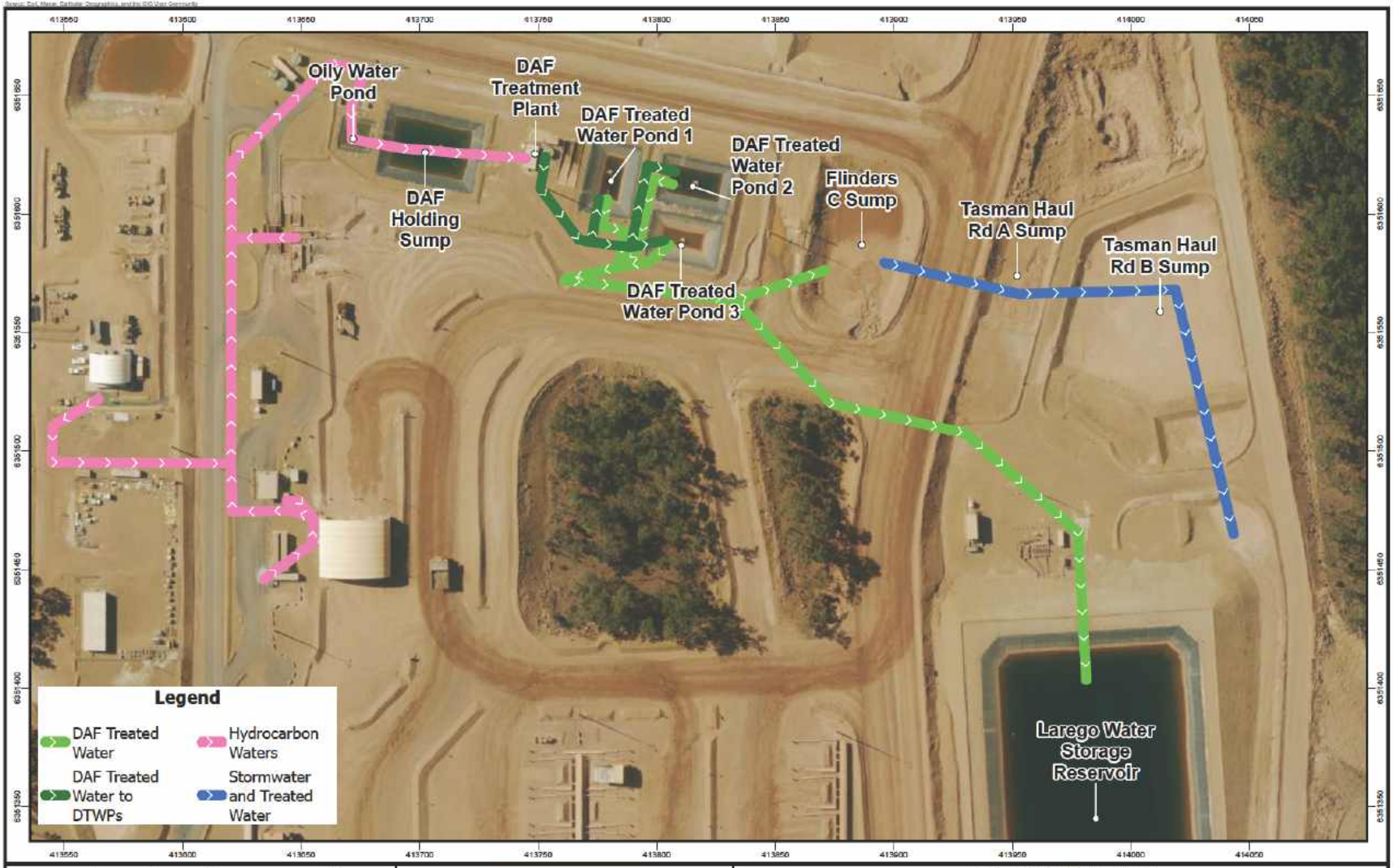

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AGD 1984 AMG Zone 50

Drawing #: Figure 6 Laregro DAF Treatment

Author: smita

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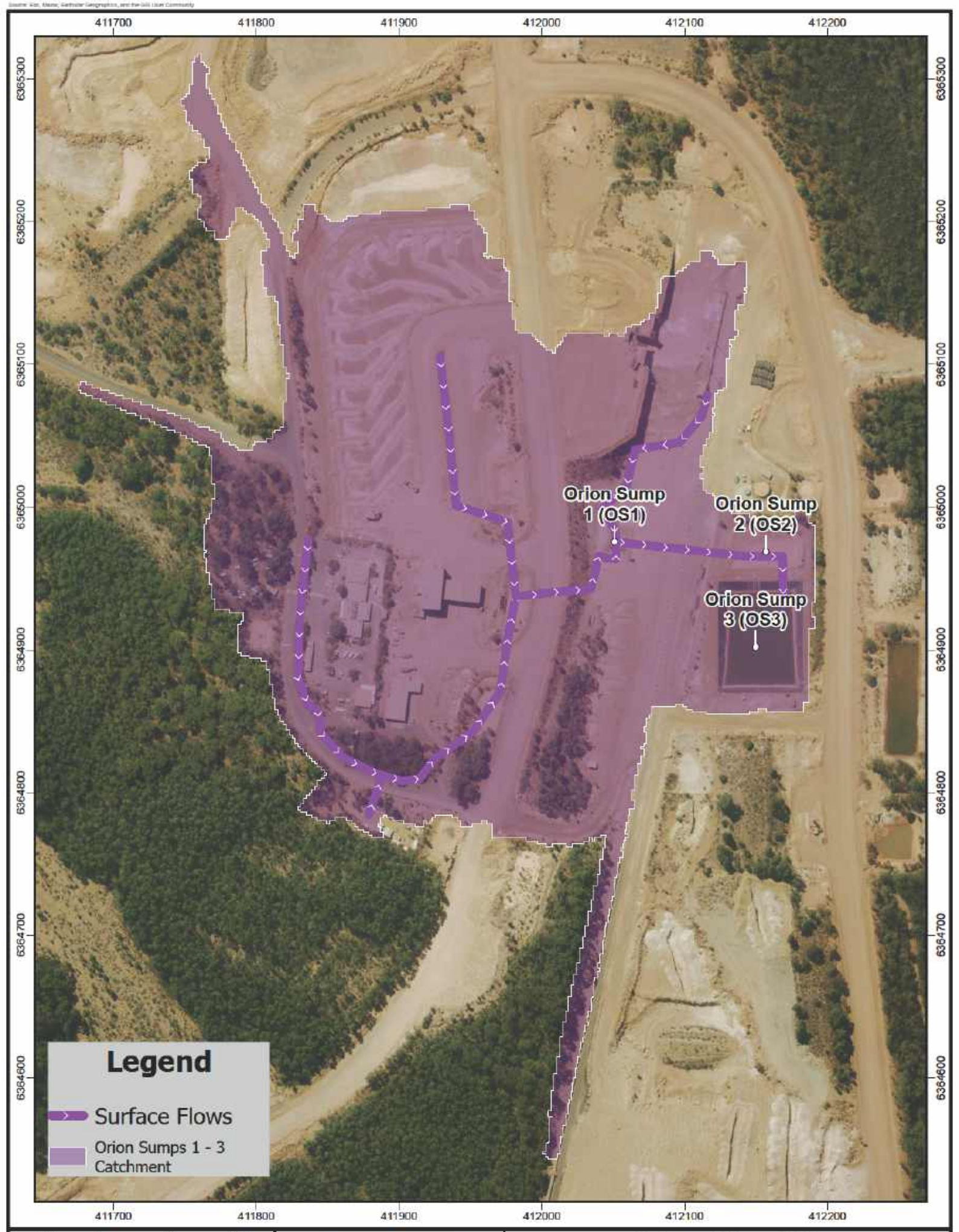
Figure 6 Laregro Dissolved Air Floatation (DAF) Water Treatment



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AGD 1984 AMG Zone 50

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Figure 7 Orion Infrastructure

Drawing #: Figure 7 Orion Infrastructure			Author: smita
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