7 Exploration

The requirement for an Exploration DE is sourced from the ESD (EPA, 2024a). The Exploration DE is related to exploration activities within and outside Alcoa's Mine DEs and covers 178,340 ha, extending from Mundaring in the north to Collie in the South. This area has not undergone detailed environmental and social investigations, relying on publicly available data to inform impacts, with more targeted investigations undertaken prior to actual disturbance as identified through progressive planning. Actual disturbance is approved through the existing State Agreements and MMP approval process.

7.1 Overview

Exploration activities are conducted to define ore bodies and assess the quality and quantity of bauxite. Exploration activities consist of drilling for soil, rock, groundwater, and mineral exploration. Exploration is conducted via three styles of drilling campaigns to obtain information for mine planning purposes:

1. Exploration and development drilling (consisting of approximately 99% of drill holes),
2. Supplementary drilling; and
3. Groundwater bore drilling (consisting of less than 1% of drill holes) – undertaken to increase local and regional knowledge of groundwater level and quality

Although using different drilling techniques, all types of drilling are aligned in operating practices and risk management controls to ensure minimal to no ground disturbance and are considered low-impact exploration activities.

Exploration and drilling predominately involve a fleet of tractor-mounted drill rigs which have been modified to operate in forested areas with negligible ground disturbance. These rigs are compact and self-contained, suitable for the environment and the smaller diameter shallow holes they drill. The results inform long-term strategic business decisions and provide Alcoa with knowledge for planning and assessing mining constraints, such as heritage, water resource planning, and forest management.

Although using different drilling techniques, all types of drilling are aligned in operating practices and risk management controls to ensure minimal to no ground disturbance within the lease. The data obtained during exploration drilling and associated activities determines the potential mining footprint (resource) and therefore inputs into further studies and investigations required for development (e.g., geotechnical, geophysical and groundwater).

The Exploration DE is a much larger area than the Mine DEs. However, it should be noted that there is a negligible actual total disturbance footprint. The minimal disturbance is due to the design of the exploration equipment and processes to ensure activities minimise clearing or disturbance of leaf litter or topsoil.

Figure 7-1 shows the Exploration DE and proposed drilling intensity.

7.1.1 Exploration and Development Drilling

Exploration and development drilling is used to define the lateral and vertical extents of ore bodies, understanding the location and quality of bauxite and improve the confidence of tonnes and grade estimations.

It represents the bulk of drilling activity and utilises a fleet of tractor-mounted drill rigs, which have been modified to operate in forested areas with minimal ground disturbance. While this fleet uses drilling techniques generally used in the WA mining sector, it has been customised to be compact and self-contained (no support trucks). This suits the environment and the smaller diameter shallow holes it drills.

Various stages of drilling are used, each with a reducing footprint, to ensure that only areas with the highest probability of being mined are drilled at the highest density (15 m x 15 m grid).

Firstly, exploration drilling targets areas outside of Alcoa's current mining operational envelope with a broader extent but less intense activities (i.e., 240 m x 60 m or 120 m x 60 m drilling densities). The results from this drilling activity allow for longer-term knowledge for planning and assessment of mining constraints (i.e., heritage, water resource planning, forest management planning) to inform longer-term strategic business decisions.

Development drilling activity can then occur, which enables improved resource knowledge, evaluation of future mine development options, and accurate identification of the proposed clearing boundaries. This drilling is completed in three phases of targeted drilling with 60 m x 60 m, 30 m x 30 m, and 15 m x 15 m drilling densities.

After approximately 12 months, the drill rig path and drill hole location are difficult to identify due to minimal disturbance and natural recovery.

The rigs, which have been designed to be compact and self-contained (no support trucks or drill pads are needed) for exploration and development drilling, significantly reduce the impact in comparison to standard exploration drilling rigs. These tractor-mounted drill rigs operate on large forestry tyres to minimise compaction and ground disturbance. The holes drilled are smaller in diameter and shallower (being 4.5 cm to 7.5 cm diameter holes), to an average depth of 6 m. Samples are split and bagged at the rig and the discarded material is used to backfill the hole as soon as drilling is completed. This is more suitable for drilling in a forested areas and minimises the impact to the environment.

7.1.2 Supplementary Exploration Drilling

Alcoa is undertaking a small volume of supplementary diamond drilling or triple tube aircore as part of ongoing exploration activities. Supplementary drilling will improve Alcoa's knowledge of the regolith profile, water tables, geophysical, and metallurgical properties of bauxite. This additional information may be required to support mining studies with respect to approvals, mining, and processing.

Supplementary drilling may use alternative drill rigs, however the smallest and most efficient rig available is utilised. The preference is to place drill holes on or adjacent to existing disturbance. The environmental impact of this activity is low and will be minimised through:

- Minimising supplementary drilling by drilling less than 50 holes per annum.

- Employment of the best available drill rigs that can operate without the need to build tracks, pads, or sumps.
- Utilising compact design rigs that utilise a method to recirculate and contain drilling fluids for off pad disposal.
- Mounting rigs on metal tracks to minimise soil compaction.
- Drilling holes up to 140 mm in diameter with a maximum depth of 60 m.
- Collar cutting and plugging all holes in line with DEMIRS drill hole rehabilitation guidelines.
- Pre-planning and marking paths to drill sites to ensure rigs can access drill sites with minimal disturbance to the forest.

If ground disturbance is visibly greater than the typical exploration and development tractor-mounted drill rigs, appropriate rehabilitation of that disturbance will be undertaken. Rehabilitation will be back to a level equivalent to the disturbance that typically results from the exploration and development tractor-mounted drill rigs traversing through the forest. Such rehabilitation can be completed through the use of manual hand tools; however, the specific methodology will be dictated by the scale and nature of the disturbance.

Investigative exploration activities (such as geophysical aerial surveys, lidar, etc) are excluded from the Proposal.

7.1.3 Groundwater Bore Drilling

Groundwater bores are required to identify and monitor groundwater levels and quality. Drilling is undertaken by the smallest and most efficient rig available and support vehicles. A small track mounted rig is currently used.

Groundwater bore drilling may use alternative drill rigs, however the smallest and most efficient rig available is utilised. Proposed groundwater bores are preferably located on or adjacent to existing tracks. Clearing of native vegetation is minimised and constraints avoided.

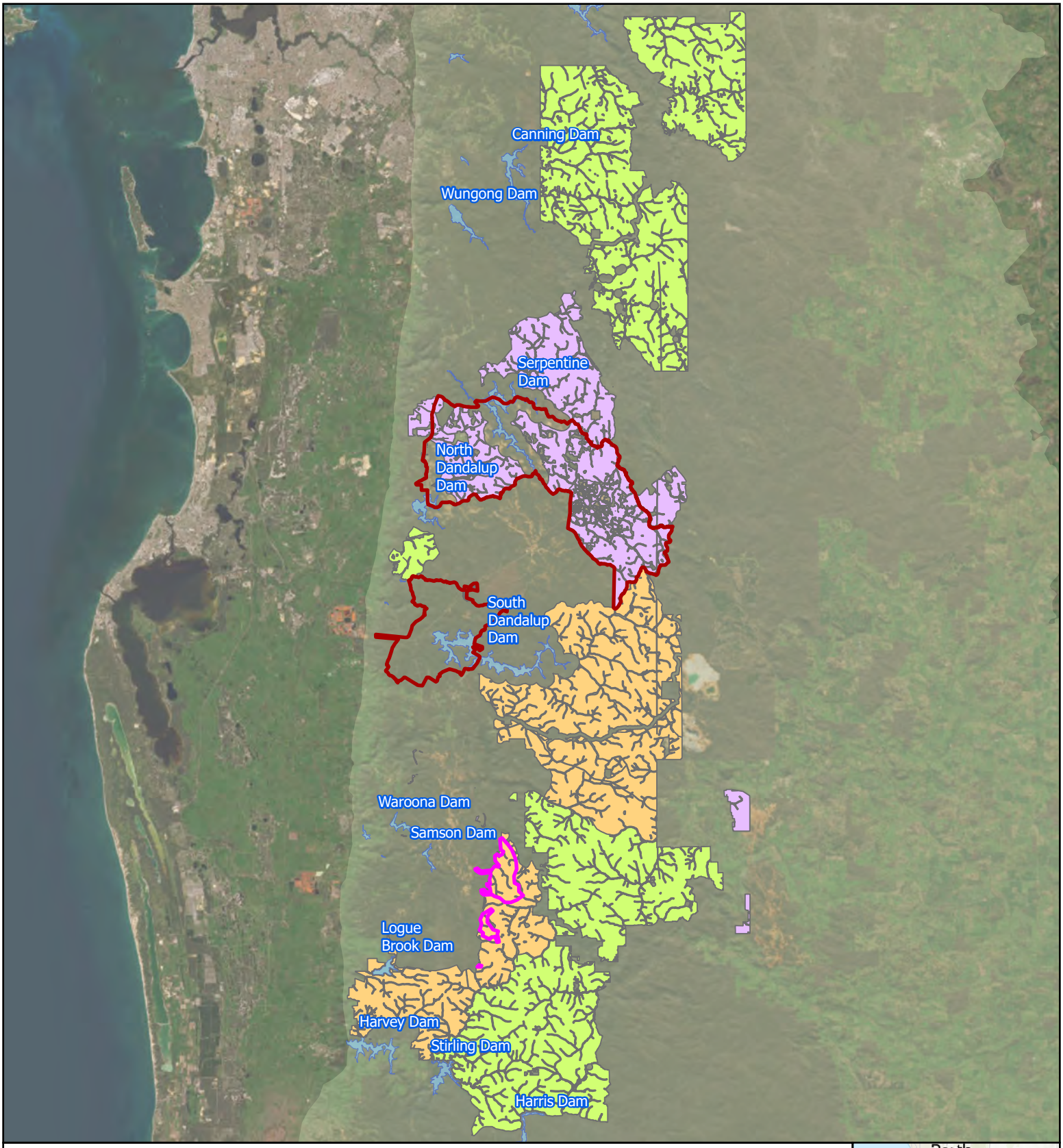
Access to a proposed groundwater bore location may include, if necessary:

- Minimal impact to ground vegetation, small shrubs, and trees with trunks up to 150mm.
- Relocation of logs and branches off the access route if no damage to other vegetation is expected.

Groundwater bore drilling includes:

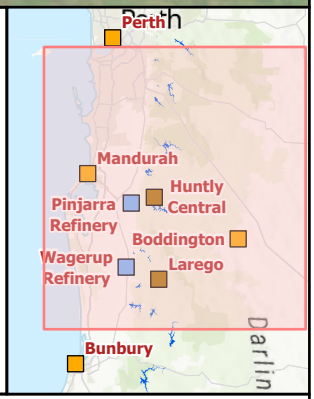
- No use of sumps or drainage channels during drilling process.
- No use of chemicals.
- Use of a “pond” if mud (drill cuttings and water) is produced from the groundwater bore. The pond is cleaned up after drilling.
- Replacing logs and branches that were purposely blocking tracks during rehabilitation.
- Rehabilitation of obvious track footprints by a skid steer or small excavator.

Groundwater bores may require consultation with DBCA with regards to the bore location, access and level of disturbance. If required, further approvals through DBCA may be obtained, particularly in instances of medium forest disturbance.



Legend

- Huntly Mine DE
- Willowdale Mine DE
- Exploration DE
- Indicative Drill Intensity
  - Infill & Wide Spaced Drilling
  - Infill Drilling
- Wide Spaced Drilling
- Reservoirs
- IBRA sub-region (Northern Jarrah Forest)



Bauxite Mining on the Darling Range in the Southwest of WA - 2023 to 2027

Figure 7-1 Exploration DE and Proposed Drilling Intensity

Kilometres

0 5 10 15 20 25 30

Scale: 1:600,000 at A4

Date Printed: 26/02/2025

N

Alcoa

7.2 Receiving Environment

Alcoa has not conducted any detailed activity/site-specific environmental investigations or surveys for the Exploration DE, except in some areas where there is overlap with the Mine DEs. Therefore, for the purposes of this assessment, information from publicly available sources and existing Alcoa MMP studies that overlap with the Exploration DE have been used. The environmental impact assessment has been completed on a previous version of the Exploration DE (total of 179,730 ha).

7.2.1 Flora and Vegetation

The majority of the Exploration DE is located within the Southwest Botanical Province as mapped by Beard (1990), within the Jarrah Forest bioregion and NJF IBRA subregion (Figure 7-2). The NJF subregion covers approximately 1.90 million ha and is broadly characterised by Jarrah (*Eucalyptus marginata*) forest on ironstone gravels and Marri-Wandoo (*Corymbia calophylla – E. wandoo*) woodlands on loamy soils, with *sclerophyll* understoreys.

The NJF subregion retains over approximately 1.11 million ha (58% of the pre-European extent) of native vegetation. Approximately 69% of the 1.11 million ha of native vegetation is within DBCA managed lands in the west and south (GoWA, 2019). Substantial clearing has occurred for agriculture in the north and east, as well as urban rural residential areas in the Perth Hills (e.g., Gidgegannup, Mundaring, Roleystone, Kalamunda).

Within the approximate 178,340 ha of the Exploration DE, the regional vegetation can be broken up into six Pre-European vegetation associations, and 18 vegetation complexes. The areas of these have been calculated based on online data, Pre-European Vegetation (DPIRD-006) and Vegetation Complexes – South West forest region of Western Australia (DBCA-047). Descriptions of the vegetation complexes has been summarised in Table 7-1 and Table 7-2 and shown in Figure 7-2 to Figure 7-4.

The prevalent vegetation association and vegetation complex over the Exploration DE is the West Darling_3 association covering over 99% of the area and the Dwellingup D1 (described as being the Darling Plateau Uplands: Open Forest of Eucalyptus *marginata* subsp. *marginata-Corymbia calophylla* on lateritic uplands in mainly humid and subhumid zones), covering approximately 35.6% of the Exploration DE.

A broad data search for conservation significant flora species declared under the *Biodiversity Conservation Act 2016* recorded within the Exploration DE was undertaken using the Dandjoo Biodiversity Data Repository. The conservation status summary revealed 12 vulnerable, 13 critically endangered and nine endangered species and an additional 165 species with a priority status have been historically recorded within the Exploration DE (DBCA, 2025). Alcoa undertakes desktop reviews and infield verification prior to undertaking exploration and implements avoidance measures where conservation significant species are identified.

Table 7-1: Pre-European vegetation associations within the Exploration DE

Vegetation association	Area in Exploration DE (ha)	Proportion of Exploration DE (%)	Pre-European extent in NJF (ha)	Current extent in NJF (ha)	Proportion remaining (%)
3	178,216.40	99.16%	908,100.00	723,446.00	79.7%
4	632.37	0.35%	614,201.00	197,904.00	32.2%
128	102.27	0.06%	4,757.00	4,124.00	86.7%
946	13.05	0.01%	2,618.37	463.00	17.7%
1114	444.75	0.25%	2,995.84	1,919.50	64.1%
1184	320.91	0.18%	14,002.91	3,754.00	26.8%

Table 7-2: Vegetation complexes within the Exploration DE

Vegetation complex	Description	Area in Exploration DE (ha)	Proportion of Exploration DE (%)	Pre-European extent in NJF (ha)	Current extent in NJF (ha)	Proportion remaining (%)	Proportion of current extent protected for conservation (%)
Cooke, Ce	Darling Plateau Uplands: Mosaic of open forest of Eucalyptus marginata subsp. marginata-Corymbia calophylla (subhumid zone) and open forest of Eucalyptus marginata subsp. thalassica-Corymbia calophylla (semiarid and arid zones) and on deeper soils adjacent to outcrops, closed heath of Myrtaceae-Proteaceae species and lithic complex on granite rocks and associated soils in all climate zones, with some Eucalyptus laeliae (semiarid), and Allocasuarina huegeliana and Eucalyptus wandoo (mainly semiarid to perarid zones).	7,643.84	4.25%	35,569.8	29,531.5	83.0	77.0

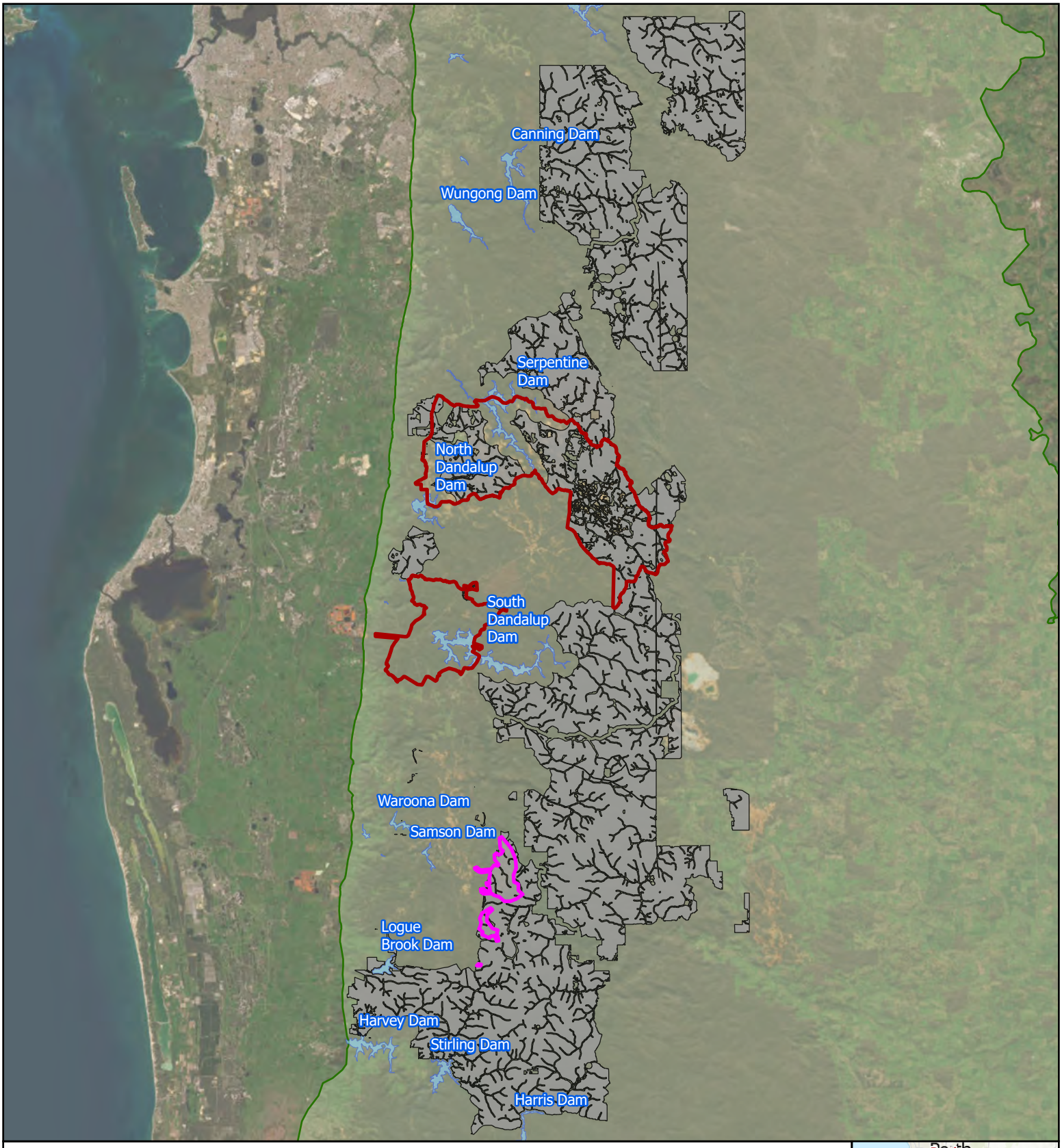
Vegetation complex	Description	Area in Exploration DE (ha)	Proportion of Exploration DE (%)	Pre-European extent in NJF (ha)	Current extent in NJF (ha)	Proportion remaining (%)	Proportion of current extent protected for conservation (%)
Coolakin, Ck	Woodland of Eucalyptus wandoo with mixtures of Eucalyptus patens, Eucalyptus marginata subsp. thalassica and Corymbia calophylla on the valley slopes in arid and perarid zones.	436.46	0.24%	142,149.5	61,567.4	43.3	52.7
Darling Scarp, DS2	Darling Plateau Uplands: Mosaic of open forest of Eucalyptus marginata subsp. marginata-Corymbia calophylla, with some admixtures with Eucalyptus laeliae in the north (subhumid zone), with occasional Eucalyptus marginata subsp. elegantella (mainly in subhumid zone) and Corymbia haematoxylon in the south (humid zone) on deeper soils adjacent to outcrops, woodland of Eucalyptus wandoo (subhumid and semiarid zones), low woodland of Allocasuarina huegeliana on shallow soils over granite outcrops, closed heath of Myrtaceae-Proteaceae species and lithic complex on or near granite outcrops in all climate zones.	169.71	0.09%	26,676.1	12,871.2	48.3	36.0
Dwellingup, D1	Darling Plateau Uplands: Open forest of Eucalyptus marginata subsp. marginata-Corymbia calophylla on lateritic uplands in mainly humid and subhumid zones.	64,051.34	35.64%	170,665.5	150,362.1	88.1	95.0
Dwellingup, D2	Darling Plateau Uplands: Open forest of Eucalyptus marginata subsp. marginata-Corymbia calophylla on lateritic uplands in subhumid and semiarid zones.	24,924.69	13.87%	86,184.4	71,348.0	82.8	83.5

Vegetation complex	Description	Area in Exploration DE (ha)	Proportion of Exploration DE (%)	Pre-European extent in NJF (ha)	Current extent in NJF (ha)	Proportion remaining (%)	Proportion of current extent protected for conservation (%)
Dwellingup, D4	Darling Plateau Uplands: Open forest to woodland of Eucalyptus marginata subsp. thalassica-Corymbia calophylla on lateritic uplands in semiarid and arid zones.	14,544.38	8.09%	122,324.0	107,156.6	87.6	78.8
Goonaping, G	Mosaic of open forest of Eucalyptus marginat a subsp. marginata (humid zones) and Eucalyptus marginata subsp. thalassica (sem iarid and perarid zones) on the sandy-gravels, low wood land of Banksia attenuata on the drier sandier soils (h um id to perarid zones) with some Banksia menziesii (north ern arid and perarid zones) and low open wood land of Melaleuca preissiana – Banksia littoralis on the moister sandy soils (humid to perarid zones).	1,315.27	0.73%	22,607.3	19,819.3	87.7	90.0
Helena 1, He1	Darling Plateau Valleys: Mosaic of open forest of Corymbia calophylla-Eucalyptus patens-Eucalyptus marginata subsp. marginata with some Eucalyptus rudis on the deeper soils ranging to closed heath and lithic complex on shallow soils associated with granite on steep slopes of valleys in humid and subhumid zones.	179.55	0.10%	13,847.6	10,062.6	72.7	52.2
Lowdon, Lo	Open forest of Corymbia calophylla – Eucalyptus marginata subsp. marginata – Agonis flexuosa with some Eucalyptus wandoo and occasional Corymbia haematoxylon on slopes, and wood land of Eucalyptus rudis – Melaleuca rhaphiophylla on valley floors in humid zone.	304.34	0.17%	12,716.5	4,785.8	37.6	35.5

Vegetation complex	Description	Area in Exploration DE (ha)	Proportion of Exploration DE (%)	Pre-European extent in NJF (ha)	Current extent in NJF (ha)	Proportion remaining (%)	Proportion of current extent protected for conservation (%)
Michibin, Mi	Open woodland of Eucalyptus wandoo over Acacia acuminata with some Eucalyptus loxophleba on valley slopes, with low woodland of Allocasuarina huegeliana on or near shallow granite outcrops in arid and perarid zones.	218.84	0.12%	140,741.4	40,271.3	28.6	21.2
Murray 1, My1	Darling Plateau Valleys: Open forest of Eucalyptus marginata subsp. marginata-Corymbia calophylla-Eucalyptus patens on valley slopes to woodland of Eucalyptus rudis-Melaleuca rhaphiophylla on the valley floors in humid and subhumid zones.	8,073.86	4.49%	60,536.9	47,719.6	78.8	83.8
Murray 2, My2	Open forest of Eucalyptus marginata subsp . thalassica – Corymbia calophylla – Eucalyptus patens and woodland of Eucalyptus wandoo with some Eucalyptus accedens on valley slop es to woodland of Eucalyptus rudis – Melaleuca rhaphiophylla on valley floors in semiarid and arid zones.	1,962.38	1.09%	58,629.7	41,061.3	70.0	58.2
Pindalup, Pn	Darling Plateau Valleys: Open forest of Eucalyptus marginata subsp. thalassica-Corymbia calophylla on slopes and open woodland of Eucalyptus wandoo with some Eucalyptus patens on the lower slopes in semiarid and arid zones.	12,498.39	6.95%	134,003.5	108,481.4	81.0	80.5

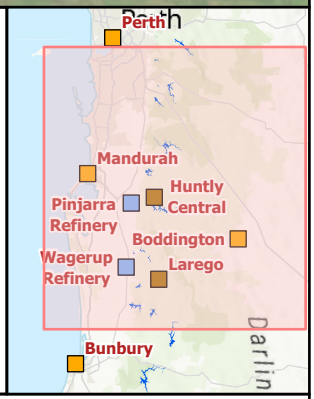
Vegetation complex	Description	Area in Exploration DE (ha)	Proportion of Exploration DE (%)	Pre-European extent in NJF (ha)	Current extent in NJF (ha)	Proportion remaining (%)	Proportion of current extent protected for conservation (%)
Swamp, S	Darling Plateau Depressions and Swamps on Uplands: Mosaic of low open woodland of Melaleuca preissiana-Banksia littoralis, closed scrub of Myrtaceae spp., closed heath of Myrtaceae spp. and sedgelands of Baumea and Leptocarpus spp. on seasonally wet or moist sand, peat and clay soils on valley floors in all climatic zones.	6,017.75	3.35%	39,775.8	34,125.8	85.8	89.4
Yalanbee, Y5	Mixture of open forest of Eucalyptus marginat subsp. Thalassica – corymbi calophylla and woodland of Eucalyptus wandoo on lateritic uplands in semiarid and perarid zones.	2,240.58	1.25%	105,279.8	70,272.0	66.7	62.0
Yalanbee, Y6	Woodland of Eucalyptus wandoo – Eucalyptus accedens, less consistently open forest of Eucalyptus marginata subsp. thalassica – Corymbia calophylla Mixture of open forest of Eucalyptus marginata subsp. thalassica– Corymbia calophylla on lateritic uplands and breakaway landscapes in arid and perarid zones.	1,257.88	0.70%	176,666.2	87,804.0	49.7	47.1
Yarragil 1, Yg1	Darling Plateau Valleys: Open forest of Eucalyptus marginata subsp. marginata-Corymbia calophylla on slopes with mixtures of Eucalyptus patens and Eucalyptus megacarpa on the valley floors in humid and subhumid zones.	15,504.53	8.63%	70,800.3	56,903.0	80.4	89.9

Vegetation complex	Description	Area in Exploration DE (ha)	Proportion of Exploration DE (%)	Pre-European extent in NJF (ha)	Current extent in NJF (ha)	Proportion remaining (%)	Proportion of current extent protected for conservation (%)
Yarragil 2, Yg2	Darling Plateau Valleys: Open forest of Eucalyptus marginata subsp. thalassica-Corymbia calophylla on slopes, woodland of Eucalyptus patens-Eucalyptus rudis with Hakea prostrata and Melaleuca viminea on valley floors in subhumid and semiarid zones.	18,385.98	10.23%	47,465.6	44,155.9	93.0	94.6



Legend

- Huntly Mine DE
- Willowdale Mine DE
- Reservoirs
- IBRA sub-region (Northern Jarrah Forest)
- Exploration DE



Bauxite Mining on the Darling Range in the Southwest of WA-2023 to 2027

Figure 7-2 Exploration DE - Northern Jarrah Forest IBRA Sub-Region

Kilometres

0 5 10 15 20 25 30

N

Scale: 1:600,000 at A4

Date Printed: 26/02/2025

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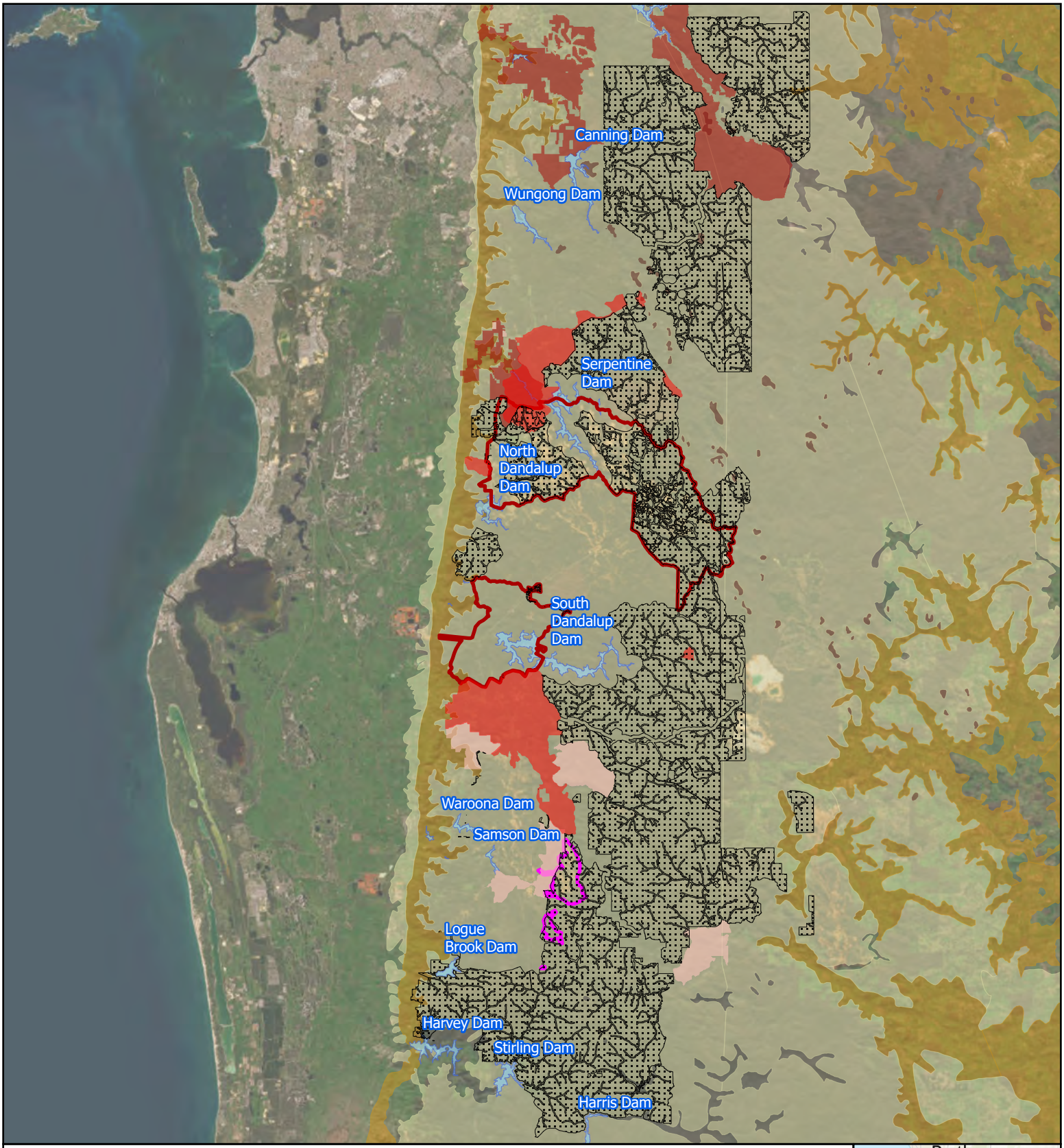


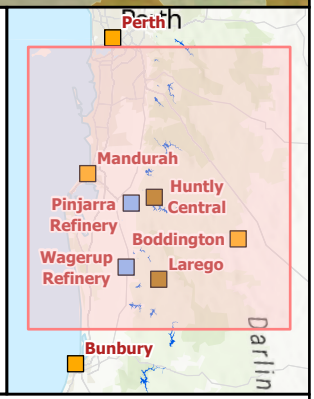
Legend

- Huntly Mine DE
- Willowdale Mine DE
- Reservoirs

Pre-European Vegetation

- 3: Forest
- 4: Woodland southwest
- 128: Rock

- Exploration DE
- National Parks
- ConservationParks
- Mining Avoidance Zones



Bauxite Mining on the Darling Range in the Southwest of WA-2023 to 2027

Figure 7-3 Exploration DE – Pre-European Vegetation Associations

Kilometres

0 5 10 15 20 25 30

Scale: 1:600,000 at A4

Date Printed: 27/02/2025

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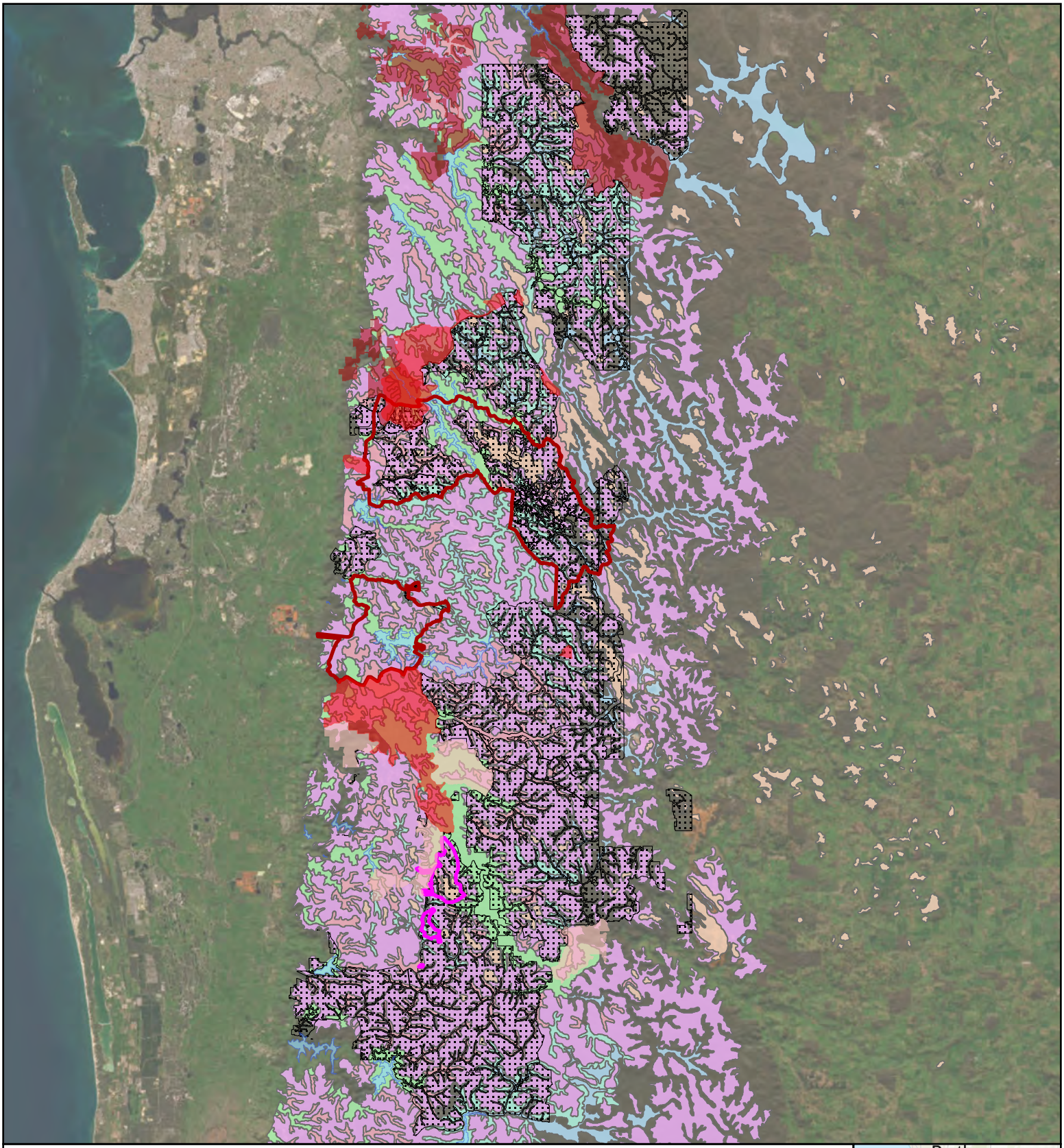
Alcoa



Bauxite Mining on the Darling Range in the Southwest of WA-2023 to 2027

Figure 7-4 Exploration DE - Vegetation Complexes

Kilometres

0 6 12 18 24 30 36

Scale: 1:600,000 at A4

Date Printed: 27/02/2025

N

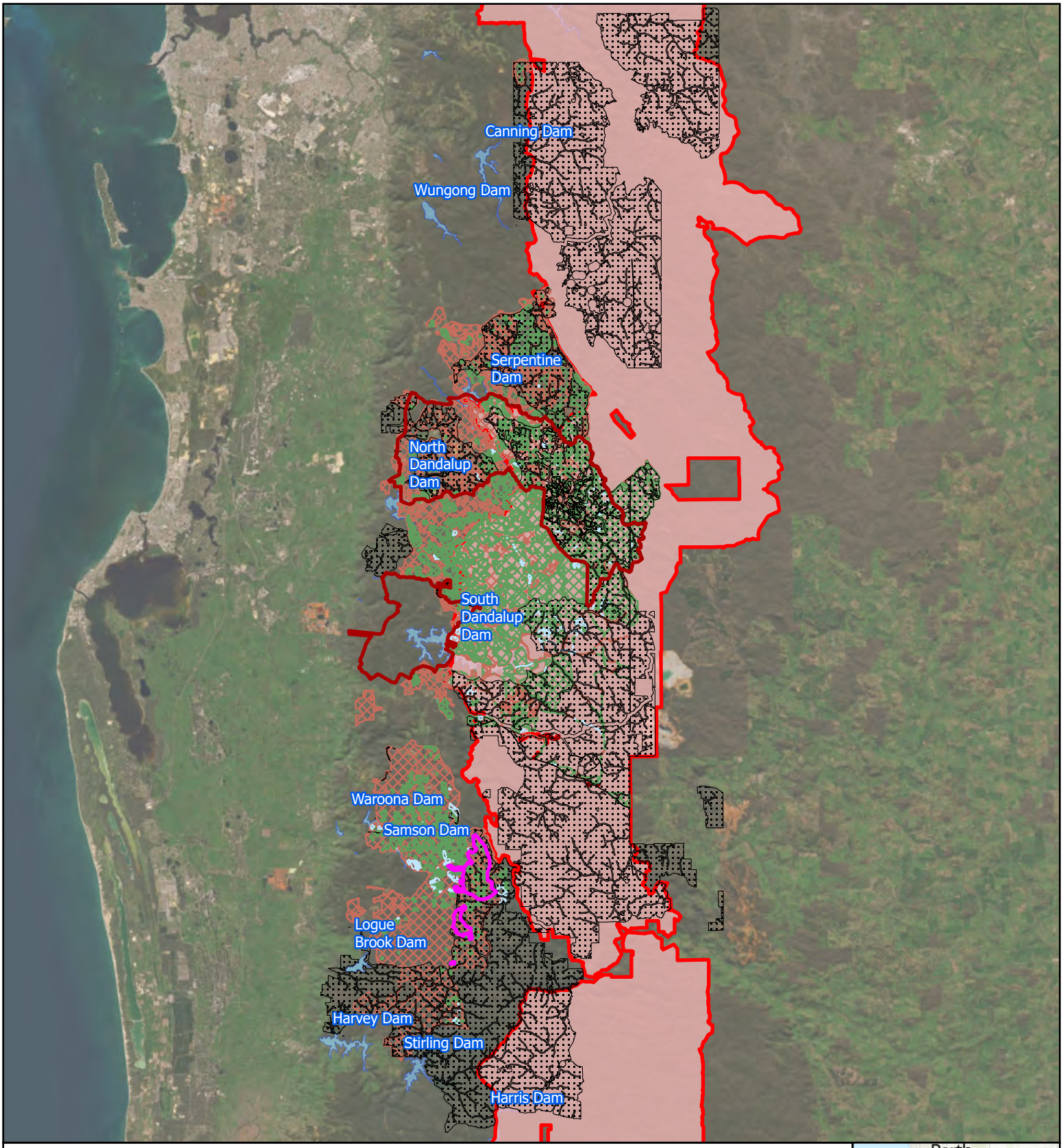
Alcoa

7.2.1.1 *Phytophthora* Dieback

Phytophthora Dieback is a plant pathogen from the genus *Phytophthora* and is one of the most significant threats to the biodiversity of Western Australia, with *Phytophthora cinnamomi*, causing greatest impact on biodiversity (DBCA, 2024a).

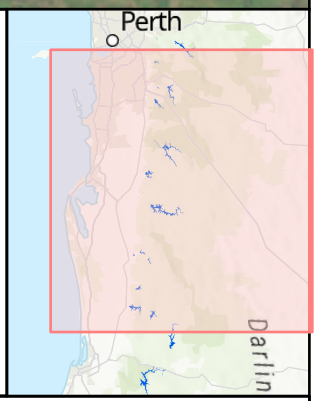
The NJF subregion has widespread *Phytophthora* dieback infestation, resulting from the extensive activity of the timber industry and environmental conditions favourable to the disease. *Phytophthora* dieback was first observed in the NJF in the 1920s; however, the causal agent was not isolated until 1964 (Bradshaw F. , 2015). The disease affects more than 20% of native plant species in the South-West region, *the most susceptible families being Proteaceae, Ericaceae and Xanthorrhoeaceae; within these families, the genera Banksia, Isopogon, Adenanthos, Persoonia, Petrophile, Xylomelum, Andersonia, Astroloma, Leucopogon and Xanthorrhoea* all demonstrate high susceptibility (Glevan Consulting, 2021). The affected species are key components of the Jarrah Forest floristic diversity (Bradshaw F. , 2015).

Phytophthora Dieback mapping has been carried out over a significant proportion of the Exploration DE and areas have been defined as having dieback, being dieback free or uninterpretable are shown in Figure 7-5.



Legend

- Huntly Mine DE
- Willowdale Mine DE
- Exploration DE
- Disease Risk Areas for Phytophthora cinnamomi dieback
- Phytophthora cinnamomi dieback
- Phytophthora cinnamomi dieback infested
- Phytophthora cinnamomi dieback uninfested
- Uninterpretable
- Reservoirs



Bauxite Mining on the Darling Range in the Southwest of WA-2023 to 2027

Figure 7-5 Phytophthora cinnamomi Dieback Occurrence - Exploration DE

Kilometres

0 5 10 15 20 25 30

Scale: 1:600,000 at A4

Date Printed: 26/02/2025

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Alcoa

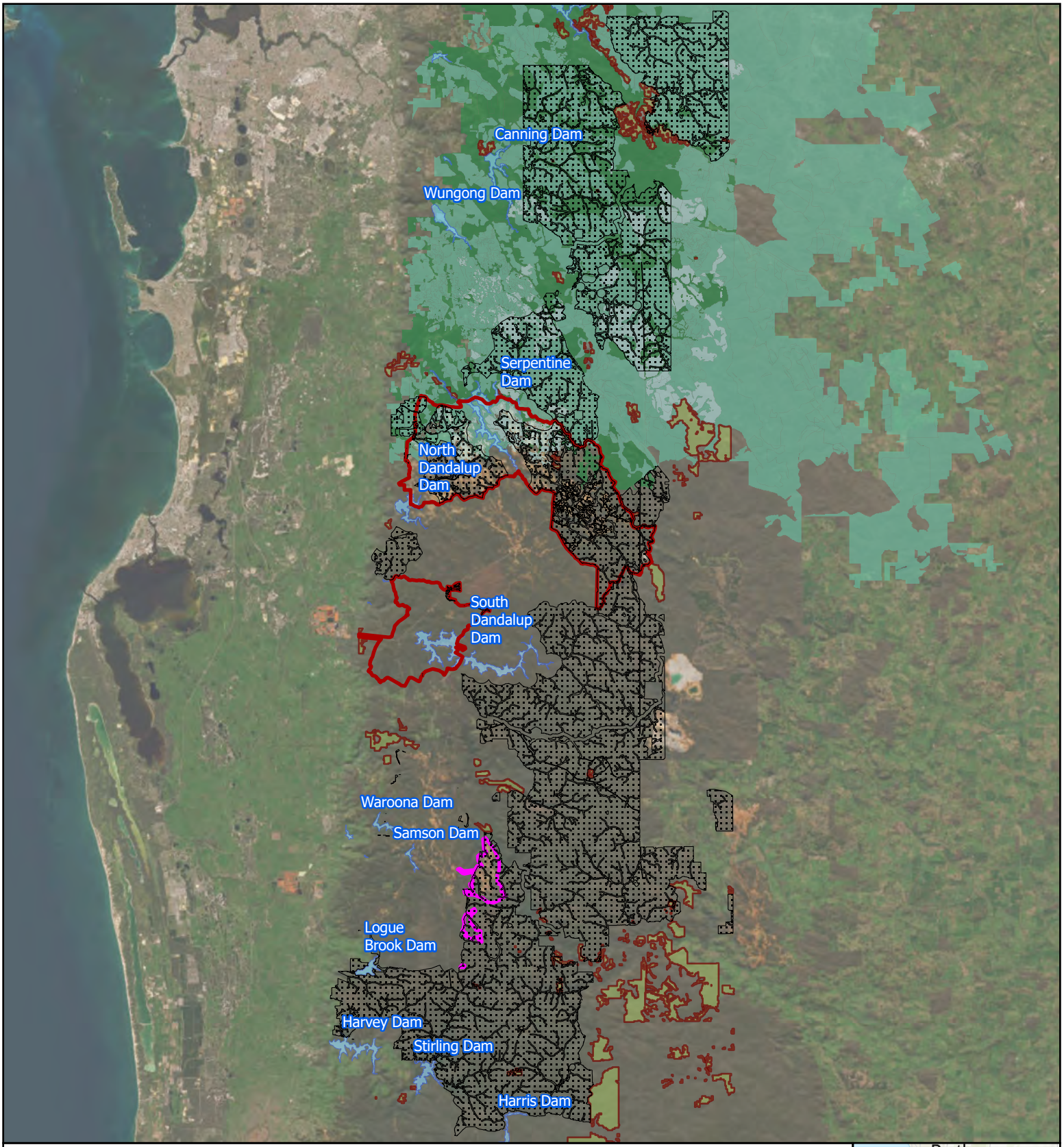
7.2.1.2 Old Growth Forest

DBCA (2024b) defines Old Growth Forest as *ecologically mature forest where the effects of unnatural disturbance are now negligible*. DBCA has completed surveys to define the forest age and location of Old Growth Forest. These areas within the Exploration DE are shown in Figure 7-6 and detailed in Table 7-3. Based on this information only 0.03% of the Exploration DE is defined as Old Growth Forest, with the largest area of potential impact being classified as 'Immature' trees which are classified as being approximately 21 to 70 years since last harvest.

Table 7-3: Forest age across the mapped portion of the NJF and within the Exploration DE

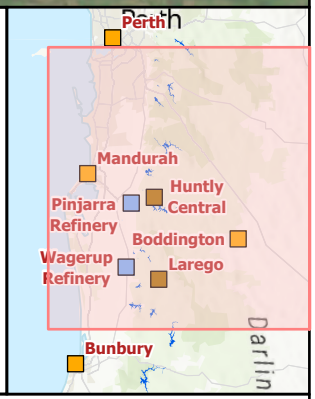
Structural stage of harvesting regrowth	Time since last harvest (years)	NJF Area (ha)	Proportion of NJF mapped area (%)	Exploration DE area (ha)	Proportion of Exploration DE (%)
Establishment to Juvenile	0-20	98,259	11.3	45,261.2	25.2
Immature	21-70	574,180	66.2	88,963.0	49.5
Mature	70+	157,370	18.2	45,264.7	25.2
No record of harvesting	N/A	37,171	4.3	241.1	0.1
Total mapped area		**866,981**	**100**	**179,730**	**100**
Old Growth Forest		22,682.67	1.20	5,859.48	0.03

Alcoa adopts similar avoidance measures for exploration for flora and vegetation as is undertaken for mining activities. Details of avoidance measures are provided in Section 5.2.7.2. This includes no exploration being undertaken in National and Conservation Parks or Old Growth areas.



Legend

- Exploration DE
- Huntly Mine DE
- Willowdale Mine DE
- Reservoirs
- Old Growth Forest
- Forest Age
  - Establishment to Juvenile
- Immature
- Mature



Bauxite Mining on the Darling Range in the Southwest of WA-2023 to 2027

Figure 7-6 Forest Age and Old Growth Forest - Exploration DE

Kilometres

0 5 10 15 20 25 30

Scale: 1:600,000 at A4

Date Printed: 26/02/2025

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7.2.2 Terrestrial Fauna

Generally, the vegetation habitats of the Exploration DE support the same fauna as discussed in the Mine DEs Terrestrial Fauna section (refer to Section 5.3). Although drilling operations, will result in noise impacts and vegetation removal, impacts on fauna species in the Exploration DE will be much lower due to the minimised and intermittent disturbance. Avifauna, such as the Black Cockatoo are particularly sensitive to sound as they are auditory organisms with acute hearing. Noise associated with drilling operations may results in Black Cockatoos temporarily leaving the immediate area and choose to forage further from drilling site, however, due to the temporary nature of exploratory drilling (a few days), long term displacement is not expected to occur.

Alcoa has conducted various targeted and baseline fauna surveys over the Mine DEs and this has been used to summarise the Exploration DE Terrestrial Fauna. A summary of the receiving environment with respect to terrestrial fauna is as follows:

- Alcoa has significant scientific knowledge of the fauna habitats within the Jarrah Forest, attained through research and having operated in the Huntly and Willowdale area. This provides contextual baseline and background data that can be applied to fauna habitats that will be present in the Exploration DE.
- Jarrah-Marri Forest and Drainage Line habitats provide core habitat for many significant species including the Chuditch, Quokka, Brush-tailed Phascogale, Quenda, Western Brush Wallaby, Woylie, and Western False Pipistrelle.
- There are likely to be habitats present in tree hollows and hollow logs which are important microhabitats for hollow-dependent species including the Chuditch and black cockatoos.
- Baudin's Cockatoo, Carnaby's Cockatoo, and Forest Red-Tailed Black Cockatoos have been recorded within the Mine DEs and are likely to be found within the Exploration DE. Black Cockatoo Nest trees have also been recorded along with habitat used for breeding and foraging.

Areas of Conservation Significant Fauna are shown on Figure 7-7 below.

All known and suitable nesting trees, Significant trees and confirmed nighttime roosting sites will be avoided with a suitable buffer (minimum 10 m radius).

In 2021, Alcoa initiated a research programme to improve knowledge of the Black Cockatoo usage of retained nesting trees within mined landscapes. This research involves revisiting retained nesting trees at various timeframes following mining activities to determine whether Black Cockatoos utilise these trees and to identify factors influencing their usage. Key variables under investigation include time since disturbance, distance to clearing, and the proportion of vegetation cleared. While the data is still undergoing detailed analysis, preliminary findings indicate that approximately 80% of revisited retained nesting trees that remain viable have been used by Black Cockatoos since their initial disturbance. Based on this preliminary evidence, Alcoa considers that the implementation of a 10 m avoidance around Black Cockatoo Nest trees is sufficient to minimise any impacts to Black Cockatoo usage of the trees, particularly given exploration activities are short-lived.

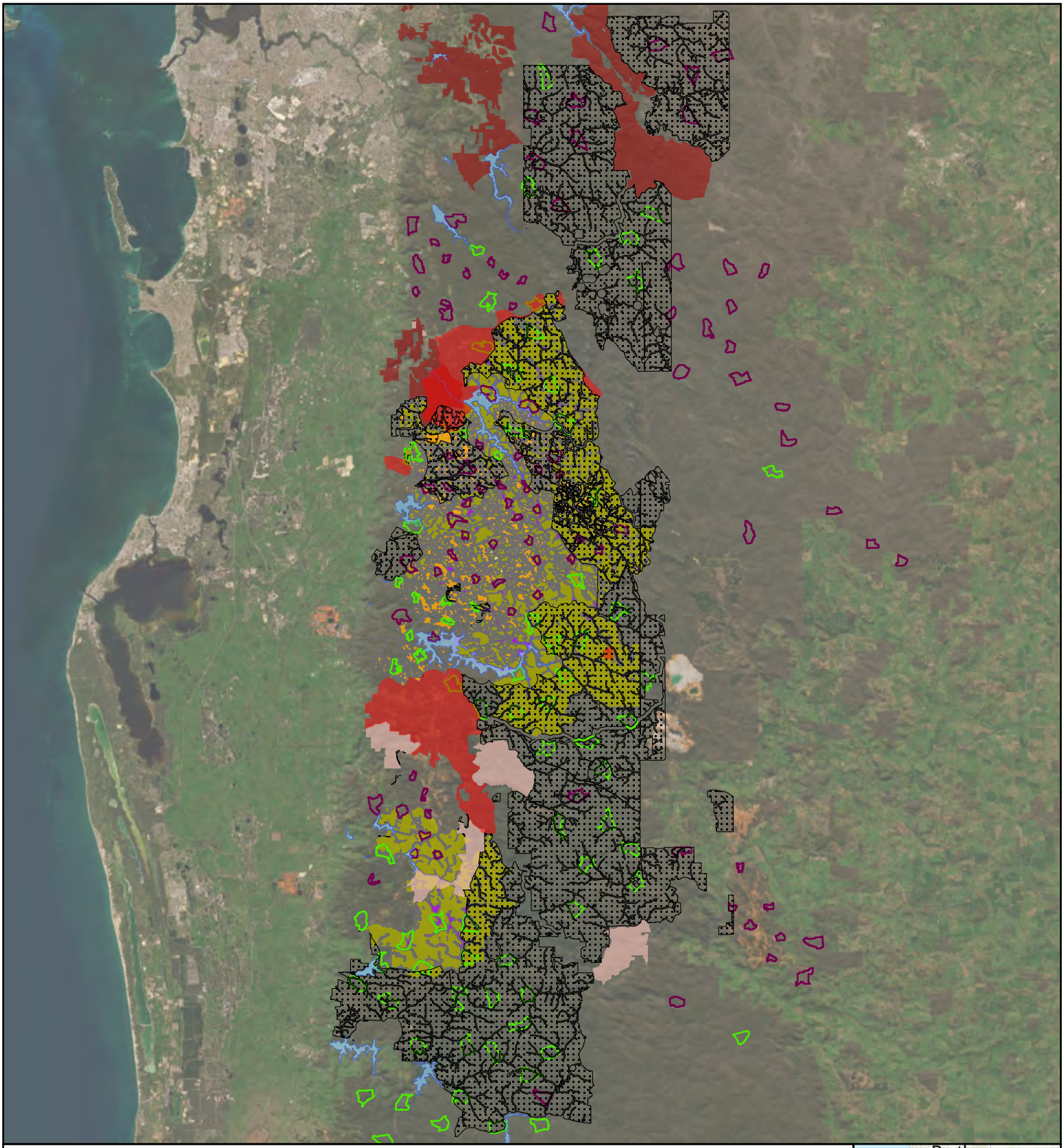
Tree hollows suitable as breeding habitat for Black Cockatoos may take decades to centuries to develop, thus protecting trees with suitable hollows during the mining process is

a critical component in avoiding and minimising mining-related impacts on these species (Alcoa, 2022b). Alcoa undertakes pre-clearance Black cockatoo drilling surveys.

For drilling purposes, two Black Cockatoo nest tree types are identified by either ground-based assessment using binoculars or drone, pole camera or telephoto lens:

- Nest trees (EPBC terminology, “known nesting trees”):
  - A tree containing one or more hollows that appear to be, or have been, used as a black cockatoo breeding habitat, or
  - a tree containing 1 or more hollows that have a diameter not less than 100 mm; and have a depth not less than 500 mm; and
  - is conducive of being used as a nesting hollow by black cockatoos, as determined by a suitably qualified and experienced person. The assessment will consider entry angle and size, hollow chamber size and shape, height from ground (not less than 6 m) and health of the tree; or
  - has the potential to develop into a suitable nesting hollow, as determined by a suitability qualified and experience person. The assessment will be based on the potential to meet the above criteria.
- Significant trees (EPBC terminology not available):
  - Healthy Jarrah trees with diameter at breast height (DBH) ≥ 2000 mm or healthy Marri trees with DBH ≥ 1500 mm, as determined by a suitable qualified and experienced person.

Trees that meet the above criteria will be given a 10 m avoidance area in which drilling activity is not permitted. DBCA also map potential and confirmed Black Cockatoo roosting and breeding sites within the Jarrah Forest and Swan Coastal Plain areas. These are shown in Figure 7-8.



Bauxite Mining on the Darling Range in the Southwest of WA-2023 to 2027

Figure 7-7 Terrestrial Fauna Habitats and Fauna Habitat Zones – Exploration DE

Kilometres

0 5 10 15 20 25 30

Scale: 1:600,000 at A4

Date Printed: 27/02/2025

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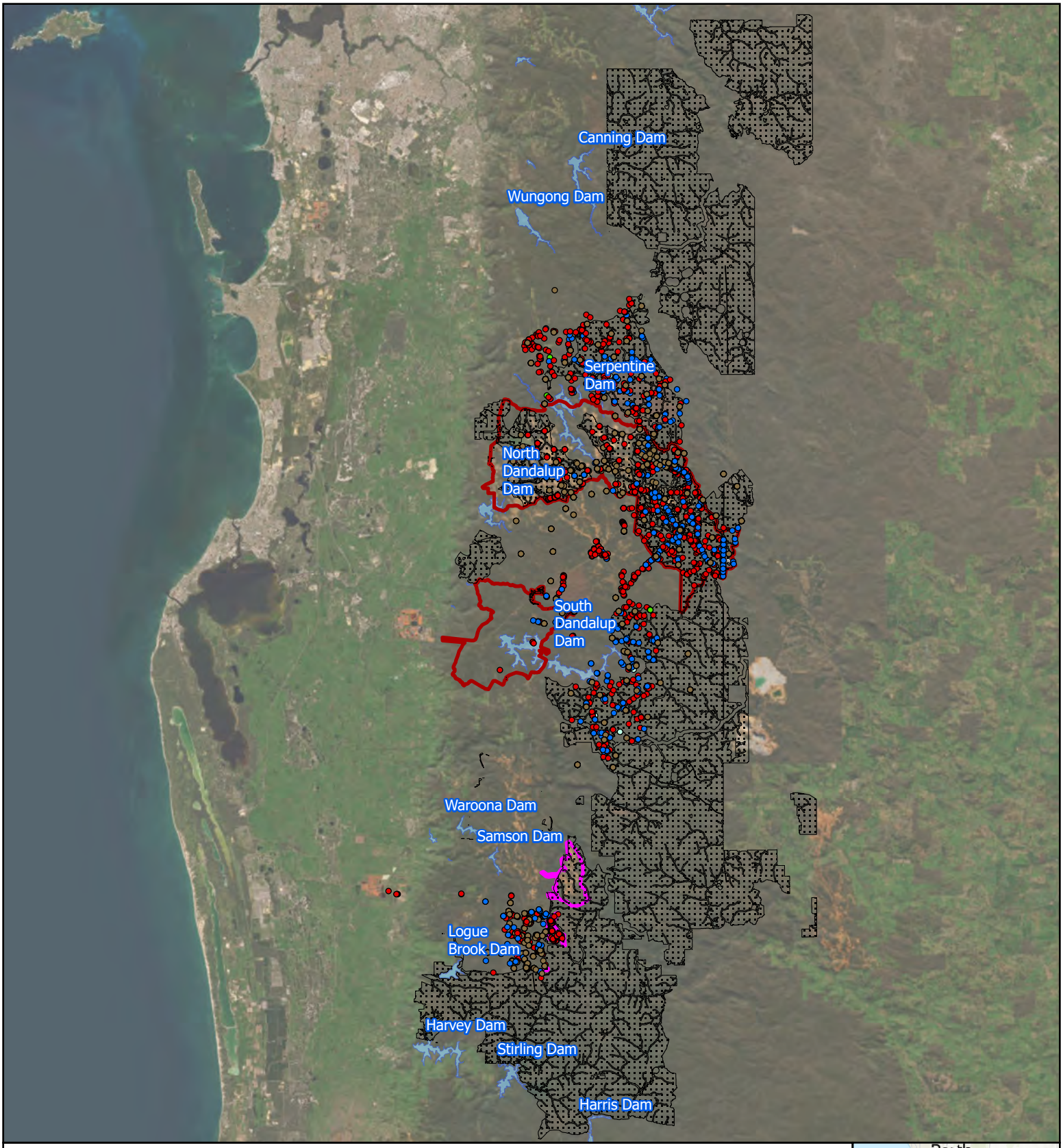
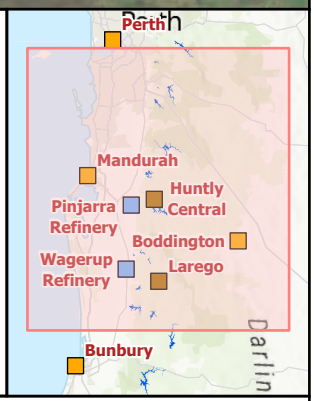


Legend

Fauna Survey Results

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Specially Protected
- Feral/Other

- Exploration DE
- Huntly Mine DE
- Willowdale Mine DE
- Reservoirs



Bauxite Mining on the Darling Range in the Southwest of WA - 2023 to 2027

Figure 7-8 Conservation Significant Fauna - Exploration DE

Kilometres

0 5 10 15 20 25 30

Scale: 1:600,000 at A4

Date Printed: 26/02/2025

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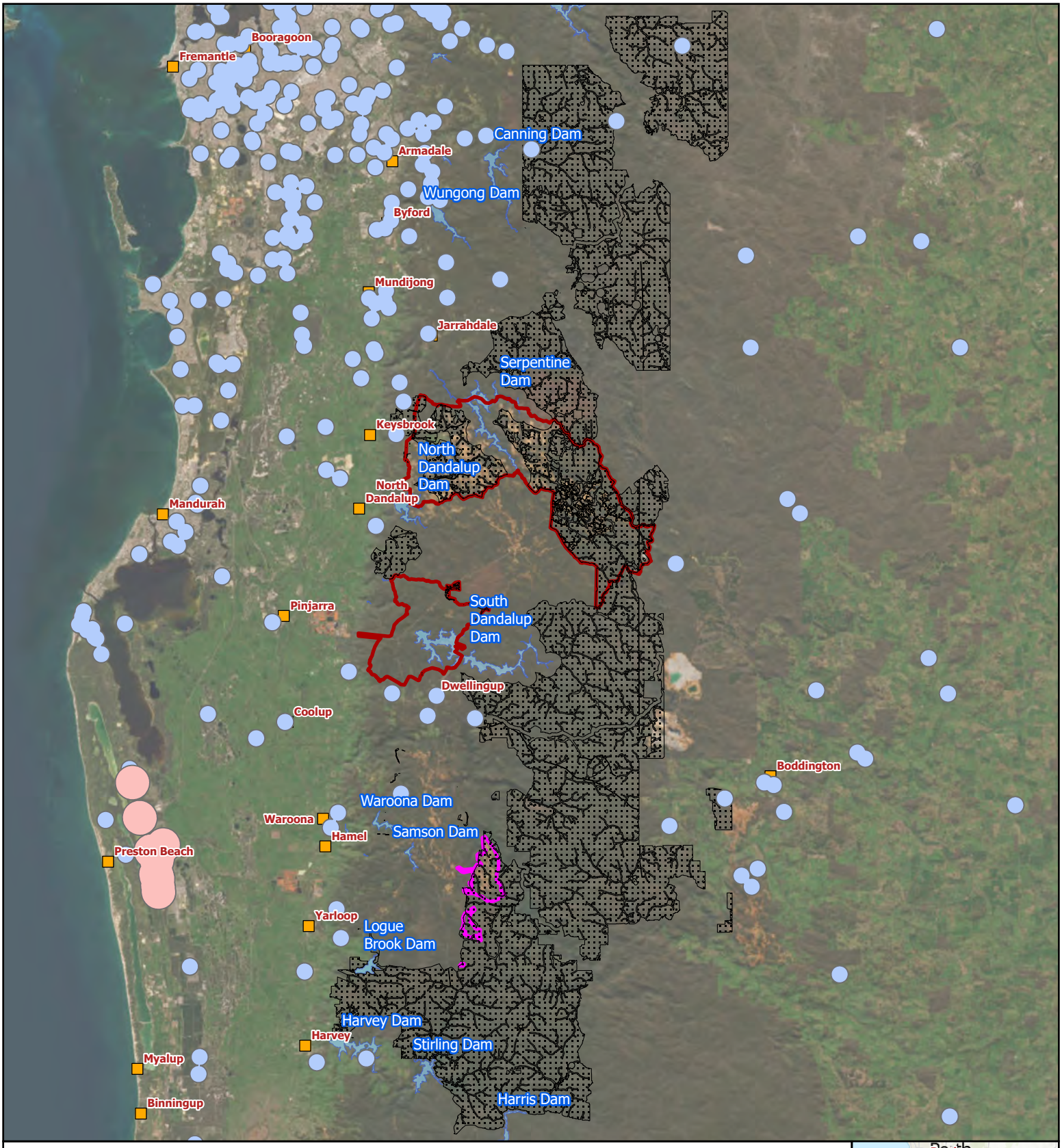
Alcoa

7.2.3 Terrestrial Environmental Quality

Generally, the Terrestrial Environment Quality of the Exploration DE will be similar as that discussed in the Mine DEs Terrestrial Environmental Quality section (refer to Section 5.4). However, impacts on Terrestrial Environmental Quality in the Exploration DE will be much lower due to the minimised and intermittent disturbance.

Important terrestrial environmental quality factors are summarised below and shown in Figure 7-9 to Figure 7-11. There are no areas of registered potential contamination within the Exploration DE. The terrestrial environment can be summarised as:

- Geology – The Exploration DE area lies within the Darling Plateau, an undulating lateritic regolith over Archaean granite with dolerite intrusions. The Darling Plateau occupies the south-western fringe of the Yilgarn Craton and is bordered by the Darling Fault and Perth Basin to the west.
- Land Systems and Soils – The Exploration DE lie within the Western Darling Range Zone which is characterised as a moderately dissected lateritic plateau on granite with deeply incised valleys, including the Darling Scarp on the western margin. Soils are formed in laterite, lateritic colluvium and weathered in-situ granite and gneiss (DPIRD, 2017a). The overburden ranges from about 0.2-4 m thick and averages about 0.6 m. The overburden is underlain by lateritic bauxite, which is approximately 4 m thick and comprises a caprock (duricrust) layer (average 0.9 m) and underlying friable layer (average 5 m). Below the friable layer is clays and saprolite of various thickness from a few metres to 10s of metres. The caprock layer is discontinuous and varies from absent to a thickness of a few metres.
- Potential Acid Forming Materials – The Darling Plateau has not been mapped by State Government for the presence of potential acid sulphate soils (PASS) nor are there published studies into the presence of acid forming materials in the regolith or bedrock. Within Western Australia, ASS are known to be present within the riverine and wetland areas, below the water table in some soils and saline areas. However, given the avoidance strategy of wetland and riverine areas (areas where PASS may be present) it is unlikely to be encountered.
- Contaminated Sites – As search of DWER's Contaminated Sites Database resulted in one recorded contaminated site under the *Contaminated Sites Act 2003* occurring within the Exploration DE. The recorded contaminated sites are shown on Figure 7-10. However, unrecorded soil contamination may be present in the Exploration DE due to past land uses such as equipment and vehicles for timber harvesting and forest management, or historic use of PFAS for fire response activities.

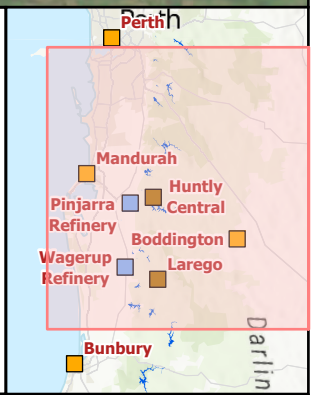


Legend

- Black Cockatoo Breeding Sites Buffer (DBCA-063)
- Black Cockatoo Roosting Sites Buffer (DBCA-064)
- Exploration DE
- Huntly Mine DE
- Willowdale Mine DE

Places

- City/Town
- Reservoirs



Bauxite Mining on the Darling Range in the Southwest of WA - 2023 to 2027

Figure 7-9 Black Cockatoo Roosting and Breeding Sites - Exploration DE

Kilometres

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Scale: 1:600,000 at A4

Date Printed: 27/02/2025

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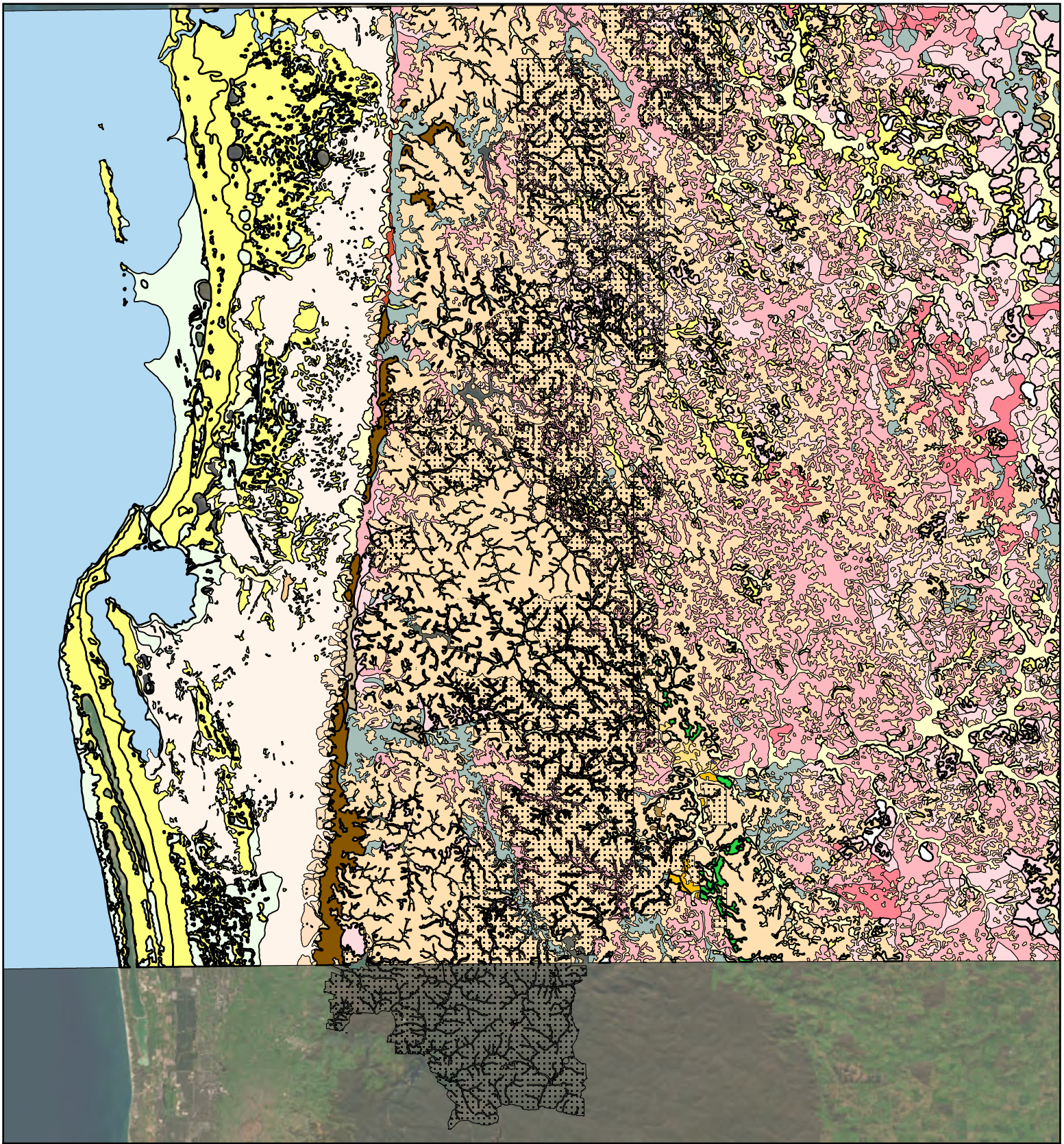

Bauxite Mining on the Darling Range in the Southwest of WA - 2023 to 2027

Figure 7-10 Regional Geology - Exploration DE

Kilometres

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Scale: 1:600,000 at A4

Date Printed: 26/02/2025

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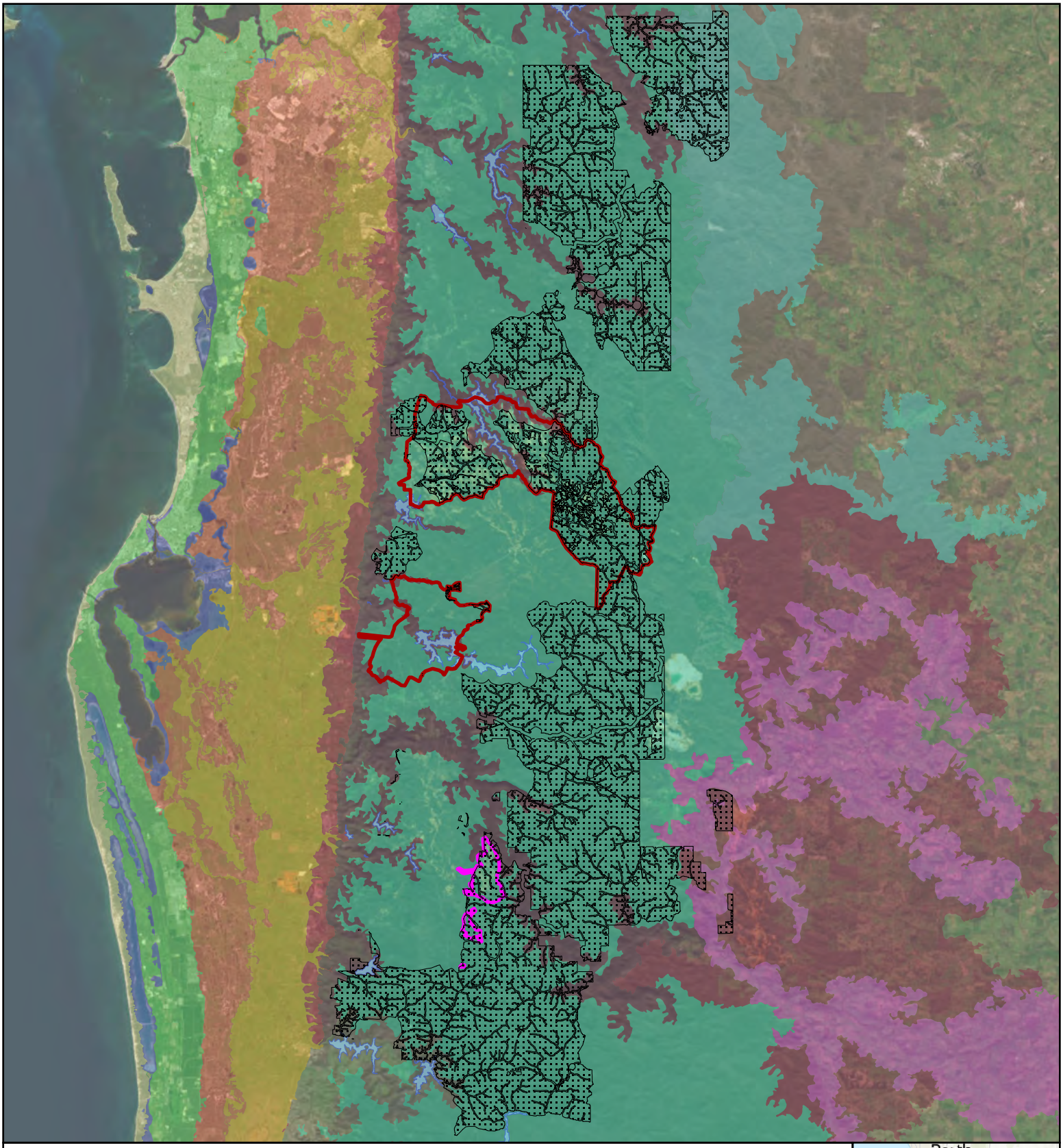

Bauxite Mining on the Darling Range in the Southwest of WA - 2023 to 2027

Figure 7-11 Exploration DE – Mapped Landscape systems and Soils

Kilometres

0 5 10 15 20 25 30

Scale: 1:600,000 at A4

Date Printed: 26/02/2025

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7.2.4 Inland Waters

The Exploration DE intersects with the Lane Poole Conservation Park and various catchment areas as shown in Table 7-4 and Figure 1-8, noting that only intersected sub-catchments are included.

Table 7-4: Sub-catchments Intersected by the Exploration DE

Catchment & Total Extent (ha)	Sub-catchment	Total Extent (ha)	Extent within Exploration DE (ha)	Extent within Exploration DE (%)
Harvey River (Harvey Diversion) 71,250 ha	New Harvey Dam	12,745.28	2,926.56	22.96
	Stirling Dam	25,257.23	16,814.91	66.57
Harvey River (Harvey Estuary) 104,228 ha	Clarke Brook	2,162.43	1,192.19	55.13
	Logue Drain	13,224.07	1,166.54	8.82
	Samson Drain	19,030.59	16.62	0.09
	Waroona Drain	9,803.56	0.23	0.00
	Unnamed	12,615.40	500.83	3.97
Murray River (Peel Estuary) 811,656 ha	Chalk Brook	30,538.25	6,672.20	21.85
	Conjurunup Pipehead	3,919.77	374.56	9.56
	Davis Brook	6,913.02	3,388.72	49.02
	Hotham River	62,882.61	8,504.14	13.52
	Marrinup Brook	7,763.93	0.06	0.00
	Murray River	73,231.35	25,209.21	34.42
	North Dandalup Below Dam	9,870.65	546.97	5.54
	North Dandalup Dam	15,154.77	2,063.15	13.61
	Serpentine Dam	651.33	160.88	24.70
	South Dandalup Below Pipeheads	4,161.26	448.82	10.79
	South Dandalup Dam	31,326.96	15,202.08	48.53
	Swamp Oak Brook	3,802.44	4,494.66	118.20
	Williams River	7,567.25	24.79	0.33
	Yarragil Brook	28,686.53	6,304.67	21.98
Serpentine River (Peel Estuary) 168,442 ha	Dirk/Karnet/Punrack	12,443.08	2,440.43	19.61
	Gooralong	5,460.69	173.14	3.17
	Serpentine Dam	65,771.34	25,819.88	39.26
	Serpentine Pipehead	2,883.09	573.03	19.88
Canning River (Swan Avon) 137,916 ha	Canning Dam	72,823.36	25,896.75	35.56
	Kangaroo Gully & Diversion	5,565.90	2,711.88	48.72
	Wungong Dam	12,845.43	1,225.36	9.54
Lower Swan (Swan Avon) 137,916 ha	Mundaring Weir	144,153.26	18,041.43	48.72
Collie River (Wellington Dam) 282,910 ha	Harris Dam	32,779.72	6,835.08	20.85

Several major rivers and mainstreams intersect the Exploration DE including South Dandalup River, Canning River, Harvey River (and Reservoir), Murray River and Serpentine River. Minor rivers that intersect the Exploration DE includes Darkin River, Davis Brook, Logue Brook Dam, and Wongong Brook. An additional 14 named minor tributaries or significant streams are also intersected. Significant hydrological channels are shown in Figure 1-8. These rivers originate within the Darling Plateau, an undulating lateritic regolith over Archaean granite (with dolerite intrusions) generally elevated between 250 and 350 m above sea level (asl), and flow westward off the Darling Plateau, via incised valleys in the Darling Scarp, and onto the Swan Coastal Plain (SCP).

Public water supply dams have been developed along the Darling Scarp to exploit the water resources created by the relatively high rainfall over the forested regolith, and the relative elevation that enables gravity supply to urban and agricultural water demand on the SCP. The Exploration DE partially overlaps multiple Priority 1 public drinking water supply areas (PDWSAs) including (as shown in Figure 7-12):

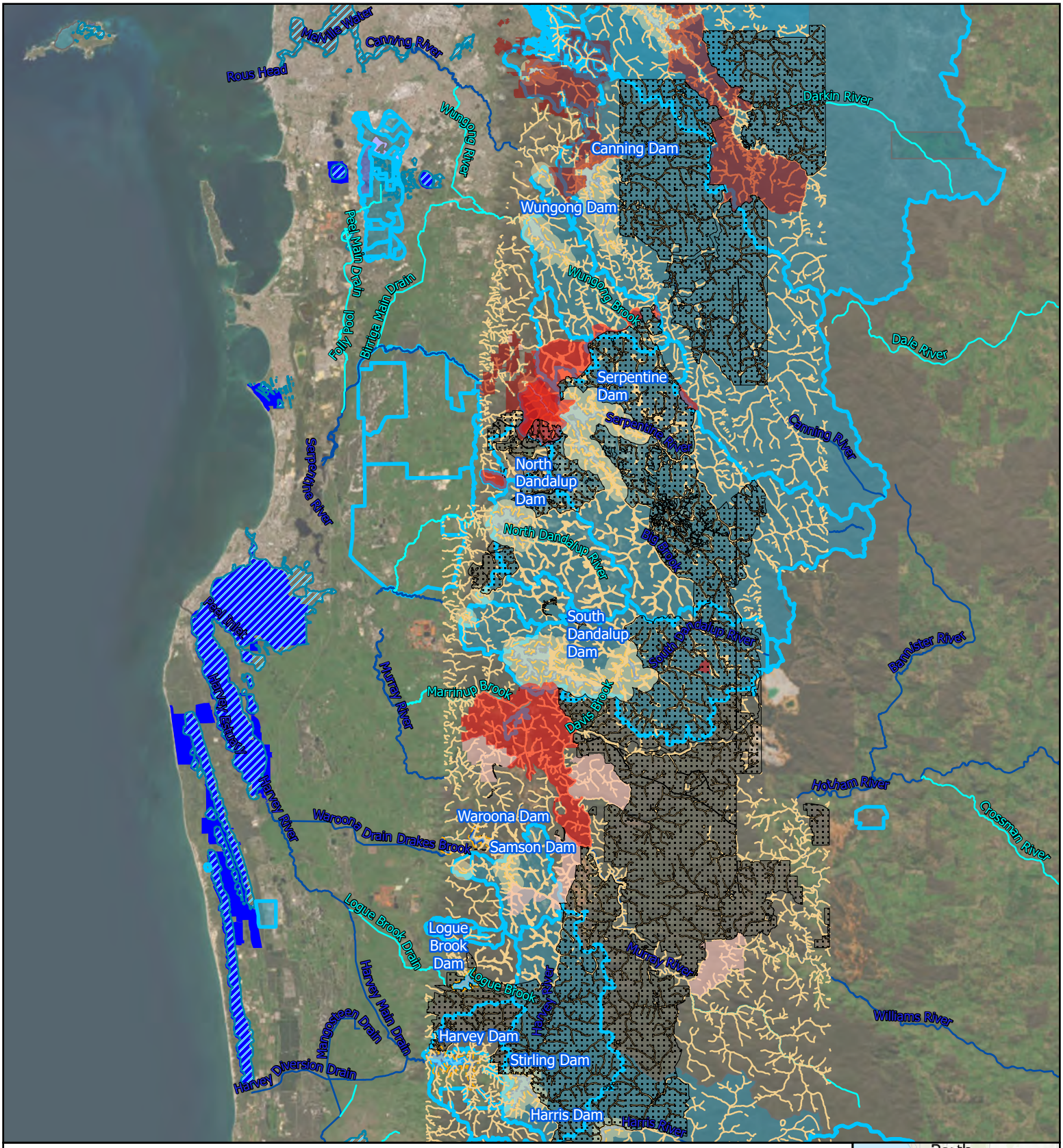
- Canning River Catchment Area
- Conjurunup Creel Pipehead Dam Catchment Area
- Harris River Dam Catchment Area
- Mundaring Weir Catchment Area
- Mundaring Weir Metropolitan Catchment Area
- North Dandalup Dam Catchment Area
- Samson Brook Catchment Area
- Serpentine Dam Catchment Area
- Serpentine Pipehead Dam Catchment Area
- South Dandalup Dam Catchment Area
- Stirling Dam Catchment Area
- Wungong Brook Catchment Area.

These catchment areas are protected under either the *Metropolitan Water Supply, Sewerage, and Drainage Act 1909* or the *Country Areas Water Supply Act 1947* and are managed under various drinking water source protection plans. A Reservoir Protection Zone (RPZ) of 2 km from the top water level is adopted for each drinking water supply dam. The Exploration DE intersects eight RPZ as shown in Table 7-5.

Table 7-5: Reservoir Protection Zones Intersected by Exploration DE

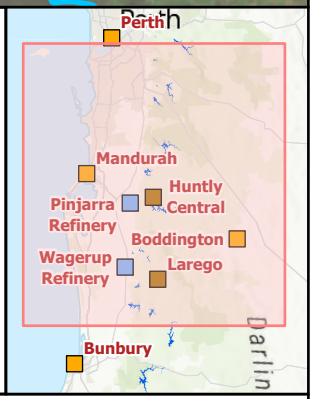
Drinking Water Supply Dam	RPZ (ha)	Area Intersected by Exploration DE (ha)	Area Intersected by Exploration DE (%)
Canning Dam	7,235.0	282.9	3.91
Conjurunup Dam	487.8	138.2	28.33
Harris Dam	7,766.7	1,354.3	17.44
North Dandalup Dam	3,937.4	477.2	12.12
Serpentine Dam	11,341.1	3,420.8	30.16
Serpentine Pipehead Dam	2,161.0	232.3	10.75
South Dandalup Dam	11,341.1	1,387.0	12.23
Stirling Dam	3,871.0	1,558.6	40.26

The Exploration DE is developed to avoid disturbing rivers and associated tributaries in the area. No exploration is to occur within 1 km of top water level of drinking water reservoirs and 100 m of stream zones. Additionally, as drilling activities (due to the resource type and location) are selected to minimise disturbance, exploration poses a minimal risk to inland waters, particularly turbidity impacts.



Legend

- Exploration DE
- Reservoirs
- Major Rivers
- Minor Rivers
- Catchments
- Directory of Important Wetlands in Australia - Western Australia (DBCA-045)
- Ramsar Sites (DBCA-010)
- Existing
- Public Drinking Water Source Areas (DWER-033)
- P1
- P2
- P3
- P3*
- Limited Disturbance Areas
- Mapped & Derived Stream Vegetation 100m Buffer
- OCA1
- 1km Reservoir Top Water Level
- National Parks
- ConservationParks
- Mining Avoidance Zones



Bauxite Mining on the Darling Range in the Southwest of WA - 2023 to 2027

Figure 7-12 Exploration DE - Inland Waters Regional Context

Kilometres

0 5 10 15 20 25 30

Scale: 1:600,000 at A4

Date Printed: 27/02/2025

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7.2.5 Social Surrounds

There are a number of social factors within the Exploration DE which have been broken down into Aboriginal Heritage, European Heritage, and Social Amenity.

7.2.5.1 Aboriginal Heritage

The Exploration DE is located within the Southwest Native Title Settlement region. This Settlement is one of the most comprehensive Native Title agreements negotiated in Australian history and involves around 30,000 Noongar people and covers approximately 200,000 square kilometres of the south-west region of Western Australia.

As part of the Settlement, the Western Australian Government formally recognised that the Noongar people are the Traditional Owners of Noongar *Booja* (Noongar land) and have cultural responsibilities and rights in relation to the land in an Act of Parliament (the *Noongar Recognition Act (WA) 2016*). Noongar groups surrendered their Native Title (thus finalising all current and preventing future Native Title claims) in consideration of this Statutory recognition. The Exploration DE intersects two separate Indigenous Land Use Agreements (ILUA) registered with the National Native Title Tribunal. The majority of the Exploration DE lies within the Gnaala Karla Booja ILUA (WI2015/005) with the remaining 19,216 ha (northern extent falling within the Whadjuk People ILUA (WI2017/015)). Alcoa considers both groups key stakeholders for works being undertaken within the ILUA area. Alcoa has commenced heritage investigations and consultation (including meeting with the Whadjuk Aboriginal Corporation Cultural Advice Committee) on early-stage exploration within the Whadjuk ILUA Area.

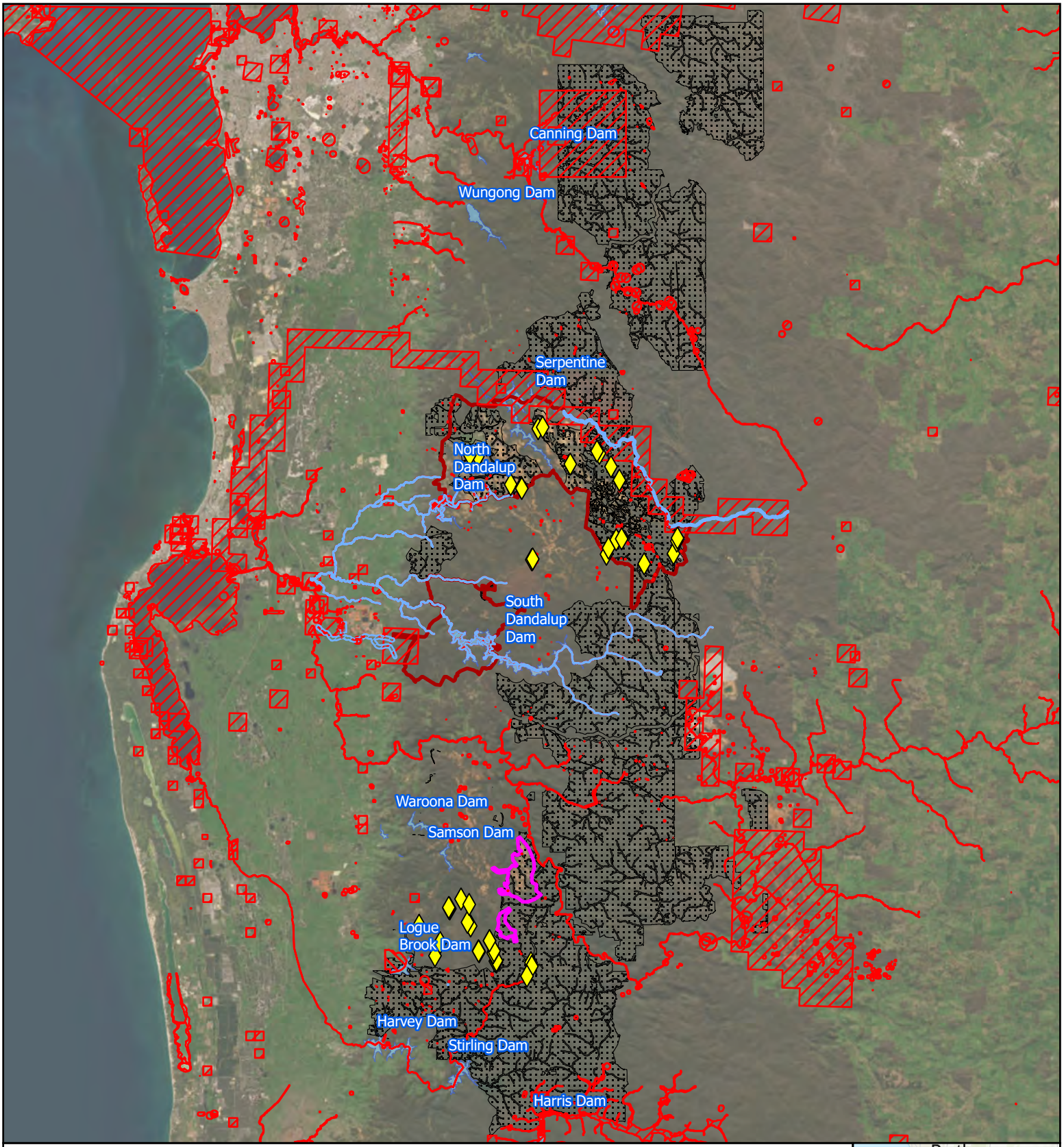
The Exploration DE intersects 20 registered Aboriginal Cultural Heritage Sites and a further 56 lodged sites as shown in Figure 7-13. Alcoa has adopted an avoidance strategy for exploration to ensure none of these will be impacted by any exploration works.

7.2.5.2 European Heritage

The Exploration DE contains and is in proximity to European heritage places and objects associated with the historic timber industry centred on Jarrahdale and Dwellingup.

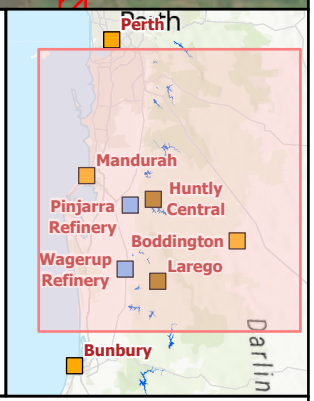
Logging commenced at ‘Jarrahdale Station’ in the 1870s with No. 1 Mill being constructed on the banks of Gooralong Brook and a railway linking Jarrahdale to Rockingham (Archae-Aus, 2021). No. 3 Mill, also known as the 39 Mile Mill, was established in the 1880s on the banks of 39 Mile Brook, while the Board Mill was established to the south-east of Jarrahdale in 1907 (Archae-Aus, 2021). Eighteen timber mills were constructed near Jarrahdale over a period 120 years, many of which were destroyed by fire and rebuilt (Jarrahdale Heritage Society, 2024). Mills and timber railways were also often dismantled and rebuilt at other locations as logging coups were exhausted of useable timber (Archae-Aus, 2021). This reuse of facilities and materials has had a profound impact on the extent to which there are physical remains of this industry surviving in the Jarrah Forest from this historical period.

Figure 7-14 shows the areas of European Heritage sites of significance within the Exploration DE. However, as per the strategy of avoidance, none of these will be impacted by any exploration works.



Legend

- Site Avoidance Surveys
- Alcoa Aboriginal Heritage Sites
- Huntly Mine DE
- Reservoirs
- Alcoa Aboriginal Heritage
- Government Aboriginal Heritage Sites
- Willowdale Mine DE
- Exploration DE
- Cultural Landscape



Bauxite Mining on the Darling Range in the Southwest of WA - 2023 to 2027

Figure 7-13 Exploration DE – Aboriginal Heritage Sites

Kilometres

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Scale: 1:600,000 at A4

Date Printed: 27/02/2025

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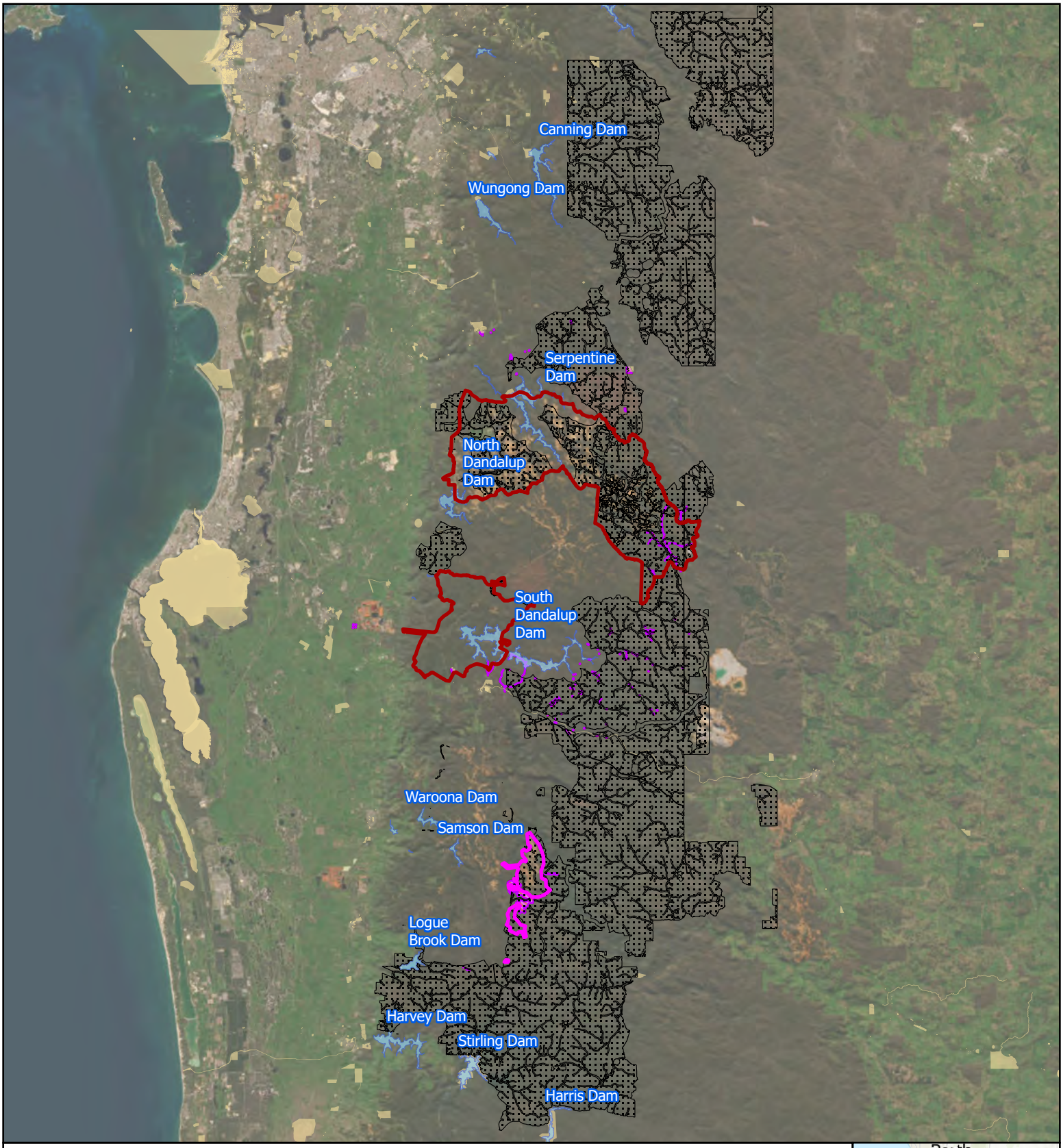
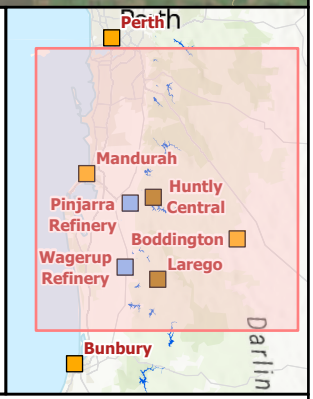


Legend

- Huntly Mine DE
- Willowdale Mine DE
- Reservoirs
- Heritage Council WA - Local Heritage Survey (DPLH-008)
- Alcoa European Heritage Sites
- European Heritage Sites
- Exploration DE



Bauxite Mining on the Darling Range in the Southwest of WA - 2023 to 2027

Figure 7-14 Exploration DE – European Heritage

Kilometres

0 7 14 21 28 35 42

Scale: 1:600,000 at A4

Date Printed: 27/02/2025

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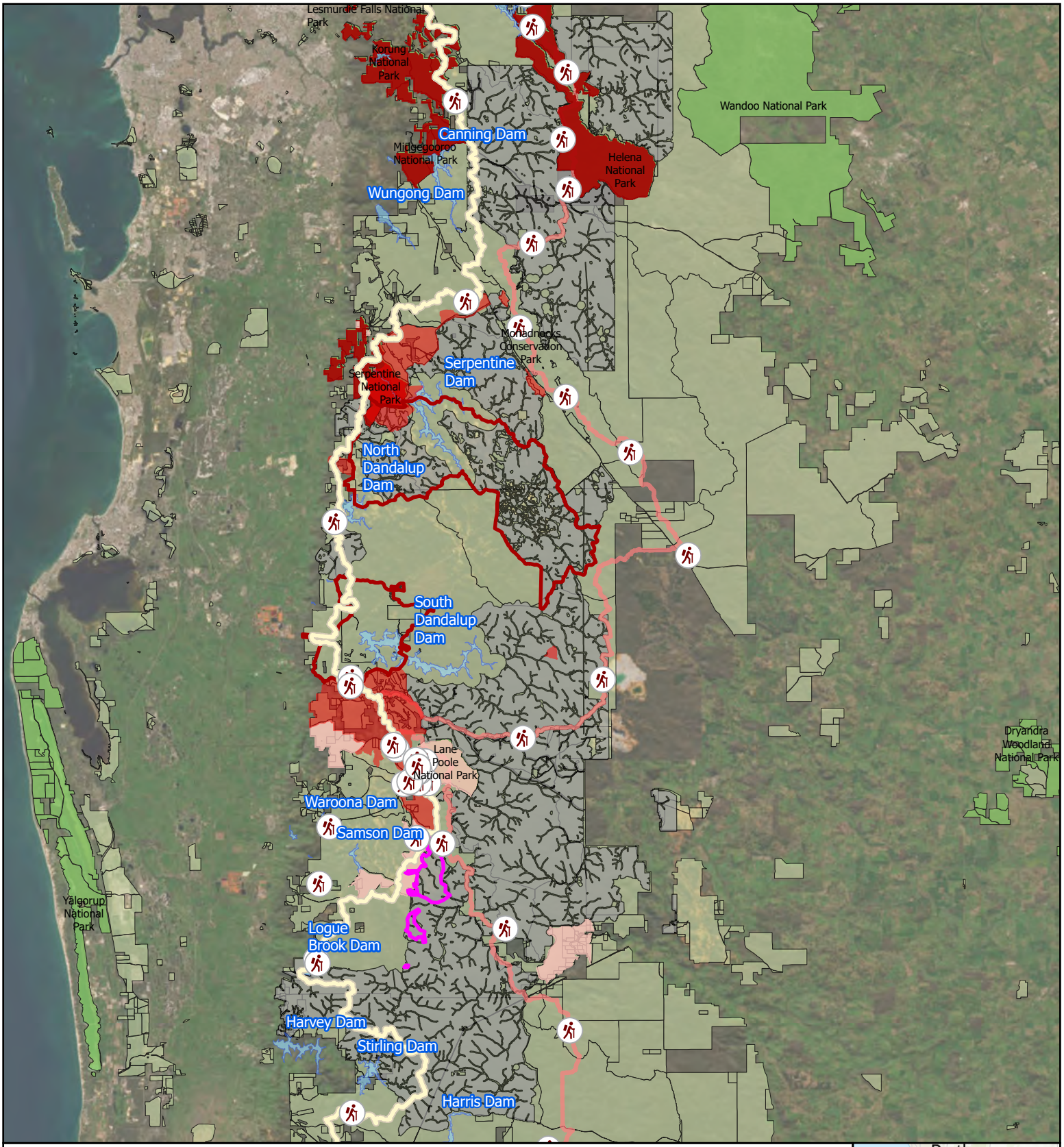
Alcoa

7.2.5.3 Social Amenity

The aesthetic, social, and economic surroundings relate to the land use and landscape values of the Proposal. The land use in this area is predominantly associated with recreational and conservation values of the NJF, incorporating the Serpentine National Park, Dwellingup, Jarrahdale and Marrinup State Forests and Lane Poole Reserve.

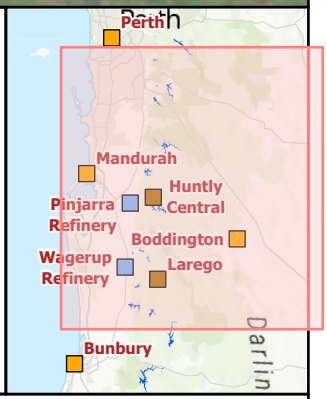
The Exploration DE spans several Shire and City regions, including the cities of Armadale and Kalamunda and the shires of Beverley, Boddington, Collie, Harvey, Mundaring, Murray, Serpentine-Jarrahdale, Wandering, Waroona, and York.

Due to the size of the Exploration DE, many towns within the NJF IBRA subregion/Darling Scarp are near areas of proposed exploration activity. The closest towns to the area lie mostly to the western sides and include Jarrahdale, Dwellingup, Waroona, Yarloop, and Harvey, and Boddington to the East. Sensitive receptors, including recreational areas, with the Exploration DE are shown in Figure 7-15. However, drilling methods area developed to avoid disturbing sensitive social receptors, with a hole taking only 12 to 15 minutes to complete, low noise levels from the rigs, insignificant dust, and nothing left behind after drilling.



Legend

- Huntly Mine DE
- Willowdale Mine DE
- Reservoirs
- DBCA - Legislated Lands and Waters (DBCA-011)
- National Park
- Conservation Reserve
- Campsites
- Munda Biddi Trail
- Exploration DE
- Mining Avoidance Zones
- Bibbulmun Track
- National Parks
- ConservationParks



Bauxite Mining on the Darling Range in the Southwest of WA - 2023 to 2027

Figure 7-15 Exploration DE – Sensitive Receptors and Recreational Facilities

Kilometres

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Scale: 1:600,000 at A4

Date Printed: 27/02/2025

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Alcoa

7.3 Potential Impacts

The following section has considered the EPA's objectives and policy guidance for each environmental factor listed in Table 7-6, below.

As detailed above, the receiving environment within the Exploration DE has been taken from publicly available sources as well as the information detailed in Section 5 for the Mine DEs. However, it should be noted that all potential impacts mentioned for the Mine DEs, although related, are not relevant to the Exploration DE due to the limited activities and minimal disturbance within the Exploration DE as opposed to the Mine DEs.

Table 7-6: Potential Environmental Impacts from Exploration Activities

Environmental Factor	Potential Environmental Impacts	Discussion
Flora and Vegetation	Loss of conservation significant vegetation, communities, and flora through clearing.	Through the implementation of site-specific exploration drilling methods (including increased drilling densities and drilling equipment modifications) direct clearing impacts resulting from exploration activities has been significantly reduced.
	Introduction of weeds and diseases through vehicle movement and interactions.	The movement of exploration equipment can also lead to indirect impacts beyond clearing and fragmentation such as the introduction or spread of weeds and diseases like *Phytophthora* dieback. While *Phytophthora* Dieback has occurred over the Exploration DE, surveys have not covered 100% of the area. When mapping has not been undertaken prior to exploration drilling, management plans state that drilling can only occur under dry soil conditions. In areas where *Phytophthora* Dieback mapping has been conducted, drilling can proceed in wet conditions. However, it is essential to clean drill rigs upon entering these areas and between drill holes. Additionally, prioritising dieback-infested zones for drilling during the wetter periods at the beginning and end of the season serves as the primary control measures against dieback. Additional information on the potential impact from introduction and spread of dieback is provided in Section 5.2.6 as well as Mitigation Strategies (see Table 7-6 below).
Terrestrial Fauna and Environment	Direct loss as a result of injury or displacement of fauna.	Through the implementation of site-specific exploration drilling methods (including increased drilling densities and drilling equipment modifications) the disturbance footprint has been reduced which limits direct impacts to fauna (injury/displacement to fauna) as well as indirect impacts through clearing. Any incidents involving fauna are reported as part of monitoring efforts.
	Destruction or fragmentation of habitats.	
Terrestrial Environment	Loss of conservation significant vegetation, communities, and flora through clearing.	The potential impacts and proposed mitigation measures are the same as flora and vegetation.
	Introduction of weeds and diseases through vehicle movement and interactions.	

Environmental Factor	Potential Environmental Impacts	Discussion
Inland Water	Reduction in inland water quality and quantity through loss of containment (i.e., hydrocarbons, oils and lubricants, hydraulic fluids) from drill rigs and vehicles, which poses a risk to water quality and aquatic ecosystems.	Drilling activities are managed to reduce impacts on inland waters. This is through location selection, avoiding areas where runoff could contaminate surface waters, and drilling practices and spill equipment to prevent groundwater contamination. The Exploration DE avoids exploration within 1 km of the top water level of Canning Dam, North Dandalup Dam, Serpentine Dam, Serpentine Pipehead and South Dandalup Dam. Additionally, the implementation of the Water Working Arrangements provides additional protections to inland waters. It is an arrangement between Alcoa, DWER and the Water Corporation which provides the framework under which Alcoa manages its mining operations within the drinking water catchments with respect to catchment protection. Additional mitigation measures are outlined in Section 5.5 Inland Waters Section for the Mine DEs.
Social Surrounds – Amenity and Heritage	Reduction in amenity though increased vehicle movements and exploration activities. Impact or destruction of sites of cultural significance.	Exploration activities can impact cultural and historical heritage sites. To mitigate this, heritage surveys are conducted prior to exploration to identify and protect significant sites. Additional mitigation measures are outlined in Section 7.4. Additionally, in June 2023, to reduce potential social and environmental impacts, Alcoa established two significant Mining Avoidance Zones around Dwellingup and Jarrahdale townsites, permanently removing these areas from future mining plans and refraining from any drilling in these zones. These areas have been removed from the Exploration DE. The Dwellingup Mining Avoidance Zone covers 8,344 ha, encompassing approximately 5,000 ha of Northern Jarrah Forest, various species habitats, and portions of popular trails. The Jarrahdale Mining Avoidance Zone, created through an approved amendment to the Huntly-Pinjarra Revised Proposal, spans 2,608 ha and increases the distance between Jarrahdale townsite and proposed future mining operations from 1.4 to 5.3 km.

7.4 Mitigation

Alcoa has implemented the mitigation hierarchy as part of their environmental management. The hierarchy is consistent with standard environmental risk management principles and comprises impact avoidance, impact minimisation, and rehabilitation.

A number of surveys are done before drilling commences to identify all the applicable constraints. These constraints are available to the Drillers in the Satellite Navigation System (SNS machine control) and on hardcopy maps as well as some constraints being defined by field markings. Alarms are set up in the SNS to alert the Driller if the rig is driven into a constrained area or associated buffers.

The main aspects that are avoided within the Exploration DE activities, include the following:

- Old Growth Forest;
- National Parks/Formal Conservation Reserves;
- Aboriginal Cultural Heritage Sites;
- Identified Granite outcrops greater than 1 ha with a 50 m buffer;
- Mapped or derived stream zone vegetation and associated 100 m buffer (Excludes any requirement/s for drilling or bores or geological investigation);
- Black Cockatoo nest and significant trees;
- TECs;
- Known Threatened flora populations and their immediate surrounding habitat.
- Bibbulmun track (200 m buffer on either side);
- Serpentine Pipehead Catchment;
- Within 1 km of the Top Water Level (TWL) of Canning Dam, North Dandalup Dam, Serpentine Dam, Serpentine Pipehead and South Dandalup Dam.
- Within 200 m of the TWL of drinking water reservoirs;
- Areas with an average pit slope greater than 16% within any RPZ

Avoidance of these factors is an established practice and carries a high certainty.

In addition to the implementation of avoidance strategies discussed above and factor specific management strategies discussed in Table 7-6, Alcoa implements the following actions during exploration activities to further minimise potential impacts:

- Limiting drilling to no more than 105,000 drill holes annually;
- Using compact, self-sufficient drill rigs (3 m wide) that do not require support trucks or drill pads;
- Drilling smaller (4.5 cm to 7.5 cm diameter) and shallower (average depth of 6 m) holes than conventional rigs;
- Minimise direct clearing for drilling and only disturbing ground when the custom-built drill rig drives over vegetation with larger tyres to minimise compaction;
- Utilise existing disturbance where possible;
- Conducting drilling in minimally vegetated areas where possible;
- New drill holes will be appropriately backfilles, capped or plugged immediately after drilling;
- Black Cockatoo pre-clearance surveys undertaken with Black Cockatoo nest and significant trees identified by either ground-based assessment using binoculars or drone, pole camera or telephoto lens;

- Including a standard buffer for Dandalup River or within 100 m of the Serpentine River.
- Undertake heritage investigations and consultation with the appropriate Aboriginal Corporations as part of exploration scheduling;
- Implementing a 10 m buffer on Aboriginal cultural heritage and identified European heritage sites. All employees are inducted and trained on Aboriginal cultural heritage;
- Immediate capping of exploration drill holes to minimise the risk of loss of fauna due to entrapment;
- Signoff of the Ground Disturbance Procedure prior to works. This includes the review of conservation-significant flora and fauna and community spatial to minimise impact to conservation significant vegetation and flora;
- Standard re-fuelling procedures, regular audits and inspections for each drilling programs;
- Minimised worker access in stream zones are used to prevent additional impacts and cross contamination; and
- Rehabilitate any areas if required.

Exploration is proposed near a number of environmentally significant areas such as reservoir protection zones and areas of high biodiversity. Due to the expanse of the Exploration DE available survey information is limited. Alcoa is committed to avoiding these areas and implements the avoidance measure as outlined above and in each environmental factor mitigation section.

7.5 Assessment of Significance of Residual Impacts

The implementation of the proposed Exploration DE has a low residual impact on the receiving environment.

Disturbance to flora and vegetation is the greatest potential impact caused by exploration, however, the selection of equipment that reduces the drilling footprint and the proposed avoidance and mitigations strategies minimise disturbance. The risk controls applied to Alcoa's exploration activities reduce the potential environmental impacts and leave an overall low residual risk rating where the residual risks are negligible.

7.6 Environmental Outcomes

The proposed environmental outcomes with respect to exploration are outlined in Table 7-7 below. These environmental outcomes have been developed in accordance with *Environmental outcomes and outcomes-based conditions – Interim guidance* (EPA, 2021c) and they:

- Reflect specific and measurable environmental states; and
- Have a clear boundary, size, extent, or limit.

Table 7-7: Proposed Environmental Outcomes – Exploration

Factor	Potential environmental impact	Environmental outcome	Other statutory approval that will assure outcome	Monitoring of outcomes
Flora and Vegetation	Direct loss of vegetation at a regional and local scale	No more than 105,000 drill holes per annum within the Exploration DE.	Assessment and approval of the MMP includes consultation with key regulatory agencies.	Annual reporting of exploration activities
		No disturbance or adverse impacts to Old Growth Forest within the Mine DEs		
		No disturbance or adverse impacts to National Parks or formal conservation reserves		
		No direct impacts (excluding monitoring and management activities) in defined Mining Avoidance Zones		
	Direct loss of conservation significant flora at a regional and local scale.	No disturbance to identified Threatened Flora species	Assessment and approval of the MMP includes consultation with key regulatory agencies.	Annual reporting of exploration activities
Terrestrial Fauna	Direct impacts to terrestrial fauna	No direct impacts (excluding monitoring and management activities) in defined Mining Avoidance Zones	Assessment and approval of the MMP includes consultation with key regulatory agencies.	Annual reporting of exploration activities
		No more than 105,000 drill holes per annum within the Exploration DE.		
		Pre-clearance surveys for Black Cockatoo trees when considered likely to occur will be undertaken. No drilling within 10 m of Black Cockatoo nest trees or confirmed night roosting trees within the Mine DE		
Inland Waters	Changes to both surface water and groundwater regimes because of Project operations, including changes in surface water and groundwater flows, and downgradient	No exploration drill holes within 100m of mapped or derived stream zone vegetation	Assessment and approval of the MMP includes consultation with key regulatory agencies.	Annual reporting of exploration activities
		Ensure the Water Resources Management Plan, once endorsed by Minister for State Development, is implemented		

Factor	Potential environmental impact	Environmental outcome	Other statutory approval that will assure outcome	Monitoring of outcomes
	receiving environments.			
Social Surroundings (Heritage)	Disturbance to Aboriginal Heritage sites and cultural values	Aboriginal cultural heritage sites maintained in accordance with the consent and recommendations of Traditional Owners.	Section 18 consent under *AH Act*	Annual reporting of exploration activities
		Ensure all Aboriginal heritage for all areas proposed to be cleared or indirectly impacted by the proposal are identified in consultation with the GKB AC.		
	Disturbance to European heritage sites	No direct impacts (excluding monitoring and management activities) in defined Mining Avoidance Zones	Assessment and approval of the MMP includes consultation with key regulatory agencies.	Annual reporting of exploration activities
		No direct impact to DPLH mapped Local Heritage Survey Places		