ASSESSMENT OF FLORA AND VEGETATION VALUES ON RESIDUE DAM EXPANSION AREAS

NEWMONT BODDINGTON G0LD MINE, WA

Prepared By

Mattiske Consulting Pty Ltd

Prepared For

Newmont Boddington Gold Mine

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Mattiske Consulting Pty Ltd

(ACN 063 507 175, ABN 39 063 507 175)

PO Box 437
Kalamunda WA 6926
Phone: +61 8 9257 1625
Email: admin@mattiske.com.au

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LIST OF ABBREVIATIONS

BAM Act:	*Biosecurity and Agriculture Management Act 2007* (WA)
BC Act:	*Biodiversity Conservation Act 2016* (WA)
BOM:	Bureau of Meteorology
DCCEEW:	Department of Climate Change, Energy, the Environment and Water
DBCA:	Department of Biodiversity, Conservation and Attractions
EP Act:	*Environmental Protection Act 1986* (WA)
EPA:	Environmental Protection Authority
EPBC Act:	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
MCPL:	Mattiske Consulting Pty Ltd
IBRA:	Interim Biogeographical Regionalisation for Australia
PEC:	Priority ecological community
TEC:	Threatened ecological community
WAH:	Western Australian Herbarium (PERTH)

EXECUTIVE SUMMARY

Newmont Boddington Gold Pty Ltd operates Newmont Boddington Gold (NBG), a gold and copper mine located approximately 130km south of Perth in the Shire of Boddington. The project was last referred to the EPA in 2012 as the Life of Mine (LOM) Extension Project, which resulted in Ministerial Statement 971. The LOM Extension Project included expansion to the open pits and waste rock dump areas, new water storage dams and a second tailings storage facility with a permitted mine life to 2041.

NBG Tailings is currently being deposited at the existing F1/F3 Residue Disposal Area (RDA) (above ground valley-fill tailings storage facilities). This facility will reach maximum design capacity in mid-2029. NBG has commenced more detailed studies for a second RDA referred to as the RDA2, to be located in Saddleback Tree farm. Whilst minor amendments to MS971 have occurred, the operation is seeking to extend the life of the mine beyond 2041. The operation has identified changes to both the authorised extent and Development Envelope which will need to be approved. The majority of the changes are associated with the footprint for the future tailings storage facility, which is undergoing more detailed study to inform design, as well as amendments to the shape of the future waste rock dump areas. Footprint changes will also be required to accommodate the bauxite mining operations for South32 Worsley Alumina Pty Ltd.

Mattiske Consulting Pty Ltd (Mattiske) was commissioned by Newmont Boddington Gold Mine (NBG) to conduct a desktop to evaluate previously defined flora and vegetation values and to undertake additional field studies on the Residue Expansion survey areas and associated Geotech sites in 2023. The survey areas have been assessed by Mattiske Consulting Pty Ltd at a regional mapping scale as part of the System 6 studies (Heddle *et al.* 1980) and later for the Regional Forest Agreement (RFA) project by Mattiske and Havel (1998) and on several occasions for both Newmont and South32 (E.M. Mattiske and Associates 1985 to 1993; Mattiske Consulting Pty Ltd 1994 to 2023).

The survey efforts over multiple survey years meet the relevant state EPA and federal DCCEEW standards to enable coverage of the flora and vegetation values and conservation values associated with the flora and vegetation.

Potential Flora Values

A total of 520 vascular plant taxa, representative of 217 genera and 73 families, have the potential to occur within the Residue Survey Areas. The most commonly represented families were Fabaceae (74 taxa), Proteaceae (40 taxa) and Myrtaceae (37 taxa). The most commonly represented genera in the survey areas were *Acacia* (25 taxa), *Hibbertia* (14 taxa) and *Lomandra* (11 taxa).

A total of 55 introduced taxa (including two planted species and 53 introduced species) may potentially exist in the Residue Expansion survey areas, based on NatureMap (DBCA 2007-) and records from Mattiske Consulting Pty Ltd (1992-2023). None of the introduced species are listed as a Weed of National Significance (DCCEEW, 2024b). Two are listed as declared under the *Biosecurity and Agriculture Management Act 2007* (WA) (DPIRD 2024).

Nine threatened species have a potential to occur in the survey areas (namely – *Caladenia hopperiana, Caladenia dorrienii, Pultenaea pauciflora, Eleocharis keigheryi, Morelotia australiensis, Andersonia sp. Saxatilis (F. & J. Hort 3324), Verticordia fimbrilepis subsp. fimbrilepis, Diuris micrantha, Anthocercis gracilis),* pursuant to section 179 of the *EPBC Act* and as listed by DCCEEW (2024a) and pursuant to Part 2, Division 1 and Subdivision 2 of the *BC Act* and as listed by DBCA (2023a). Based on local landforms, soils and distribution patterns on the basis of previous studies and information on Florabase (Western Australian Herbarium 1998-). Of these nine potential species only four have a low-moderate potential to occur in the two potential residue areas, namely - *Andersonia* sp. Saxatilis (F.J. Hort 3324), *Caladenia dorrienii, Caladenia hopperiana* and *Morelotia australiensis).*

A total of forty-five priority flora species as listed by Western Australian Herbarium (WAH 1998-), most have a low or very low potential and only three Priority 1 species has a moderate or moderate-high potential. Four Priority 3 species have a moderate to moderate-high potential to occur and three Priority 4 have a moderate to moderate-high potential to occur in the survey areas.

Potential Vegetation Values

The Residue Expansion survey areas occur within the Northern Jarrah Forest subregion of the Southwest Botanical Province. The geology of the region comprises lateritic duricrust, with drainage lines and occasional granite hills. The Northern Jarrah Forest subregion is characterised by Jarrah (*Eucalyptus marginata*) forest on ironstone gravels and Marri-Wandoo (*Corymbia calophylla* - *Eucalyptus wandoo*) woodlands on loamy soils, with sclerophyll understoreys.

No Threatened Ecological Communities (TECs) are likely to occur in the Residue Expansion survey areas (DBCA 2024a).

The regional desktop assessment highlighted several potential TECs including:

. the *Banksia Woodlands of the Swan Coastal Plain* that is restricted to the Swan Coastal Plain and as such do not extend into the Jarrah forest area on the Darling Ranges. As reflected in the IBRA regions of Australia, the Swan Coastal Plain has been defined by Thackway and Cresswell (1995) well west of the Newmont Boddington project areas.

. the *Eucalypt Woodlands of the Western Australian Wheatbelt* that is restricted to the eastern fringes of the northern Jarrh Forest on the interface with the Wheatbelt. These woodlands as defined by DCCEEW (2024b) do not occur in the Saddleback Tree Farm and as such do not extend into the Residue Expansion survey areas.

There is potential that the granite areas (G1 and G3) as recorded in small areas in the Residue Expansion survey areas may have values that overlap with the PEC defined for similar communities south of Boddington (DBCA PEC Mount Saddleback Heath Communities PEC (P1), DBCA 2023b). The Priority 1 PEC - Mt Saddleback Heath Communities, as delineated by DBCA, occurs in the Saddleback area near Boddington. This PEC community on Mt Saddleback has affinities with selected components of the site-vegetation type G as defined by Havel (1975b) and as refined and split into site-vegetation types G1, G2, G3, G4 and G5 by Mattiske in the northern Jarrah Forest areas and more specifically G1, G3 and G4 in the PAA areas by Mattiske (Worsley Alumina Pty Ltd 1985 to Mattiske 2021).

The Residue Expansion survey areas occur within the Regional Forest Agreement (RFA) area of the southwest forests and as such was considered during the RFA process.

Recorded Flora and Vegetation Values

A total of 272 vascular plant taxa, representative of 143 genera and 56 families, have been recorded in the survey areas between 2012 and 2023 within the Residue Survey Areas and adjacent areas.

No threatened flora within current listings by the Department of Biodiversity, Conservation and Attractions (DBCA 2023a, Western Australian Herbarium WAH, 1998-) and by the Department of Climate Change, Energy and the Environment and Water [DCCEEW] (2024a) under the EPBC Act 1999 were recorded in either of the residue areas.

A range of priority flora as listed by (DBCA 2024) WAH(1998-) have been recorded within the wider Sotico and Boddington Gold Mine areas surrounding the two residue areas. Two priority flora species occur within the Residue areas, namely:

- *Lasiopetalum cardiophyllum* (P4) – this species is relatively locally common within the Jarrah-Marri-Sheoak (*Eucalyptus marginata – Corymbia calophylla – Allocasuarina fraseriana*) communities near Boddington and as such is relatively restricted geographically. In view of the

degree of clearing in the residue areas this species is relatively restricted to the fringes of the southern residue area.

- *Senecio leucoglossus* (P4) – this species is widespread in the northern Jarrah but occurs as scattered individuals. This species was recorded on the western fringes of the southern residue survey area.

Heddle *et al.* (1980) defined and described the dominant pre-European vegetation of the Darling System in a series of vegetation complexes as part of the System 6 studies. Mattiske and Havel (1998) updated this initial more restricted mapping coverage to the wider south-west forest region as (Regional Forest Agreement vegetation complexes). Havel, J.J. (2000) summarized in greater detail the relationships between the landforms, soils and climatic conditions. Mattiske and Havel (1998) defined and described five vegetation complexes in the survey areas. None of these are restricted to the Residue Expansion survey areas; although the Coolakin valley systems are relatively restricted in protected areas.

A total of 20 site-vegetation types, plus 2 cleared (ag – agriculture and other), 1 plantation (pine trees) and 1 plantation (agricultural areas) were defined and mapped in the Residue Expansion survey areas. The site-vegetation types were subdivided into four main groupings associated with site conditions which reflected landforms, soils and soil moisture levels. The site-vegetation types on the extreme sites such as on the valley systems, granite outcrop areas and the creeklines differ markedly from the forest and woodland areas on the slopes and ridges.

The vegetation varied in condition from completely degraded in the pine plantation areas to either very good or excellent in the less disturbed areas, despite historical harvesting activities, fires, dieback and some established tracks.

Groundwater Dependent Ecosystems

The potential groundwater dependent ecosystems were determined on the basis of the site-vegetation types. In view of the extensive flora and vegetation studies in the northern Jarrah Forest these vegetation complexes support species and site-vegetation types that prefer and occur on seasonally moister and wetter soils on the Swamp, Pindalup and Coolakin valley systems. This approach was considered to represent a precautionary approach in the absence of detailed groundwater level data at the time of selecting the potential groundwater dependent ecosystems at this juncture.

Old Growth Forest Areas

There are no patches of old growth forests occurring in the Residue Expansion survey areas as supplied by the Department of Biodiversity, Conservation and Attractions. Old growth assessments were undertaken during the 2023 assessments. The northern area is dominated by highly modified areas associated with a pine plantation operation by Mt Saddleback Tree Farrm (formerly Sotico and Bunning operations) and the southern area abuts the current residue dam and has been disturbed by tracks, exploration grid lines and previous logging operations.

1. INTRODUCTION

Mattiske Consulting Pty Ltd (Mattiske) was commissioned by Newmont Boddington Gold Mine (NBG) to conduct a desktop to evaluate previously defined flora and vegetation values and to undertake additional field studies on the Residue Expansion survey areas as well as on the Geotech sites in 2023. The survey areas have been assessed by Mattiske Consulting Pty Ltd at a regional mapping scale as part of the System 6 studies (Heddle *et al.* 1980) and later for the Regional Forest Agreement (RFA) project by Mattiske and Havel (1998) and on several occasions for both Newmont and South32 (E.M. Mattiske and Associates 1985 to 1993; Mattiske Consulting Pty Ltd 1994 to 2023).

1.1. Location and Scope of Project

The Residue Expansion survey areas occur within the Northern Jarrah Forest subregion of the Southwest Botanical Province (Beard 1990), approximately 110 km south east of Perth, WA (Figure 1). The tenements are summarised in Figure 2.

This report describes the potential and previously recorded flora and vegetation values of the Residue Expansion survey areas and places them within a local and regional context.

1.2. Environmental Legislation and Guidelines

The following key Commonwealth (federal) legislation relevant to this survey is the:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

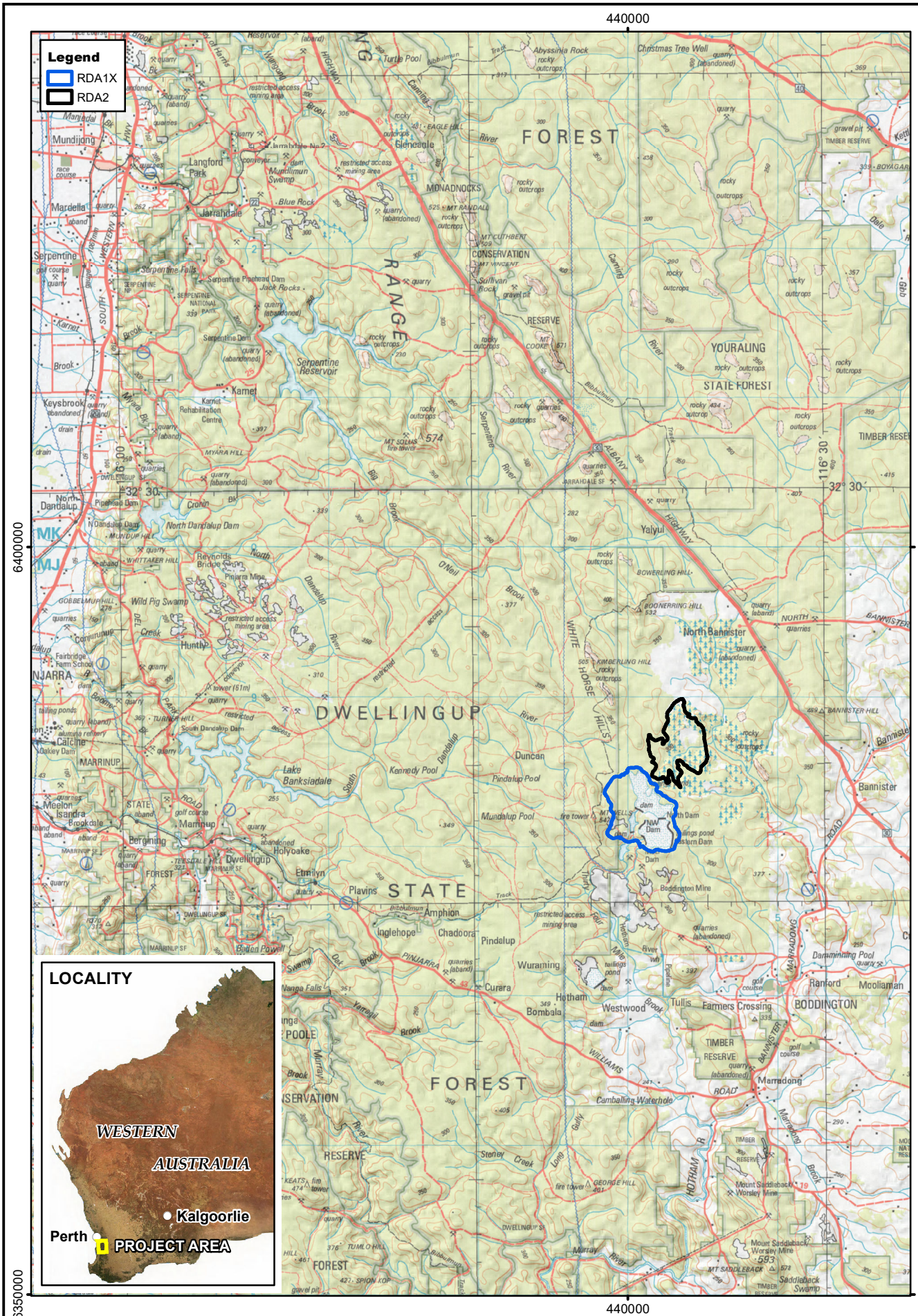
The following key Western Australian (state) legislation relevant to this survey includes the:

- *Wildlife Conservation (Rare Flora) Notice 2023*
- *Biodiversity Conservation Act 2016* (BC Act);
- *Biosecurity and Agriculture Management Act 2007* (BAM Act) and *Regulations 2013*;
- *Environmental Protection Act 1986* (EP Act); and
- *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*

Furthermore, key Western Australian guidelines relevant to this survey are the:

- *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority [EPA] 2016a); and
- *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b); and.
- *Commonwealth of Australia (2013) - Survey Guidelines for Australia's Threatened Orchids. Guidelines for detecting Orchids listed as "Threatened" under the Environment Protection and Biodiversity Conservation Act 1999.*

Definitions of flora and vegetation terminology commonly used throughout this report are provided in Appendix A1-A5.



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CAD Ref: g1881_F041_01	Author: E M Matttiske | MCPL Ref:		
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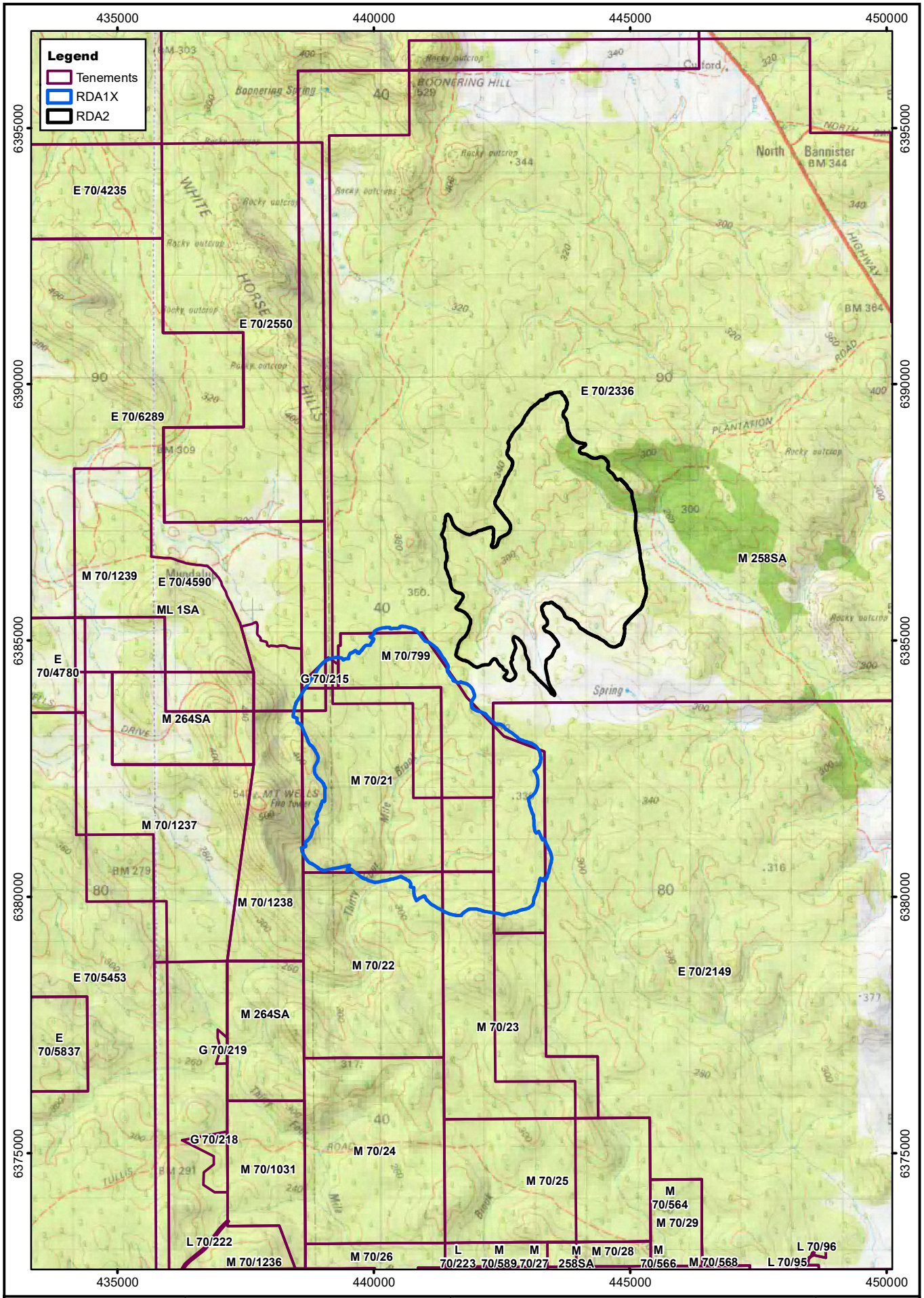

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Mattiske Consulting Pty Ltd
28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640

Author: E M Matttiske | MCPL Ref:

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Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

RDA1X & RDA2 Survey Areas
Tenements

Figure: **2**

2. OBJECTIVES

The objective of this assessment was to undertake the desktop component of an updated flora and vegetation assessment of the Residue Expansion survey areas, including:

- Update a desktop assessment of the flora and vegetation values on the Residue Expansion survey areas, with an emphasis on threatened and priority flora, and threatened and priority ecological communities;
- Review additional needs for the assessment of the flora and vegetation values on the Residue Expansion survey areas, with an emphasis on threatened and priority flora, and threatened and priority ecological communities;
- Review previous literature and current databases associated with the Residue Expansion survey areas;
- Review the conservation status of the vascular plant species and vegetation recorded by reference to current literature and current listings by the Department of Biodiversity, Conservation and Attractions (DBCA 2023a, DBCA 2023b, 2024a) and plant collections held at the Western Australian Herbarium ([WAH] 1998 -), and plants and ecological communities listed by the Department of Climate Change, Energy and the Environment and Water [DCCEEW] (2024a) under the EPBC Act;
- Undertake additional targeted field studies to assess the potential for threatened and priority flora and communities; and
- Prepare a report summarising the findings.

3. METHODS

3.1. Desktop Assessment

The NatureMap and *EPBC Act* Protected Matters Search Tool (DCCEEW 2024a) databases were used to identify the possible occurrence of flora (including threatened and priority taxa) and threatened and priority ecological communities within the Residue Expansion survey areas. The vascular plant species recorded near the Boddington area or with the potential to occur are summarized in Appendix B.

The TPFL database of threatened and priority flora and ecological communities and the Western Australian Herbarium (WAH) database were arranged by CAD Resources, where a 25 km buffer was applied (Carine, WA). In addition, any flora recorded by Mattiske (early 1980's-2023) within or adjacent to the survey areas were included.

Historical documentation and vegetation mapping of the Northern Jarrah Forest subregion that provide resource material for the floristics and vegetation of the Residue Expansion survey areas was reviewed, including Mattiske (early 1980's to 2023) reports on their flora and vegetation surveys in the nearby survey areas for the Saddleback Tree Farm (formerly Sotico), Newmont and South32. Nomenclature of flora species was checked against and is consistent with Florabase (WAH 1998-).

3.2. Field studies

Field studies on the Newmont area and adjacent Boddington areas have been undertaken for some 4 decades from early 1980's to 2023 by the Mattiske teams. To maintain consistency with previous mapping of the area, enabling spatial and temporal comparisons, flora and vegetation were assessed using site-type classification based on Havel (1975a and 1975b).

Additional targeted work was undertaken on the areas between the recording sites and also on specific areas such as the outcrop and sandier valley systems and creeklines.

This data was then used in combination with aerial imagery and field observations to map the vegetation of the survey area. Furthermore, searches for threatened, priority or Declared (plant) pests species were undertaken whilst walking between survey sites.

The following information was recorded at each vegetation assessment site:

GPS location	Easting, Northing and datum;
Soil types	gravels, sandy-gravels, sandy-loam-gravels, sandy-loams, loams, clay-loams, clays and peat;
Topography	ridge, upper slope, mid-slope, lower slope, valley floor and swamp;
Outcropping	type – granite, laterite, dolerite, and quantity – few, moderate, numerous;
Logging history	light, moderate or heavy, together with number of stumps within a 20 m radius;
Fire history	years since last fire; and
Dieback occurrence	*Phytophthora* spp. demarcation – field blazing, coloured flagging on trees, vegetation deaths, either old or recent.

At each site species were ranked according to the scale developed by Havel (1975a, 1975b). Tree and understorey species were assessed separately using the following method.

Tree species

Tree species (*Allocasuarina fraseriana, Banksia grandis, B. littoralis, B. seminuda, Corymbia calophylla, Eucalyptus marginata, E. megacarpa, E. patens, E. rudis, E. wandoo, Melaleuca preissiana, M. rhaphiophylla, Nuytsia floribunda, Persoonia elliptica, P. longifolia* and *Xylomelum occidentale*) were assessed within a 20 m radius from the observation point using the following scale:

0 absent;
1 one or two trees;
2 three to five trees;
3 more than five trees, but contributing less than one third of the total stand;
4 between one third and one half of the total stand; or
5 more than one half of the total stand.

The occurrence of Old Growth forests in the area were also undertaken during the field surveys, including during the targeted work in August-September 2024 using the document Assessment Criteria and process for the Conservation Commission review of old-growth amendments (Conservation Commission 2005).

The key determinants of **Old Growth** forests include the degree of disturbance from clearing activities, tracks, grid lines, dieback and logging as well the structural components of the forest areas. As such some of the areas within the residue areas are open woodlands, shrublands or heath and such are not defined as forests. The composition of the forests with consideration of the extent of older trees, stump numbers (if present), the composition of the stand (in terms of regrowth and balance between senescence, older trees, mature trees and saplings) all influence the decision on whether the forest constitutes Old Growth.

Understorey species

Understorey species were assessed within a 5 m radius from the observation point using the following scale:

0 absent;
1 very rarely seen, only after a careful search;
2 present, observable, but in small numbers only;
3 common locally, but not uniform over the whole area;
4 common over the whole area; or
5 completely dominating the understorey.

The physiological stress was determined for each species within a 20 m radius from the observation point and ranked according to the following scale.

0 healthy, no evidence of stress;
1 odd plant showing signs of stress, not dead;
2 one or two dead plants, near death;
3 scattered stressed plants, (2-4) dead plants around survey site;
4 susceptible plants dying or dead (> 4 plants); or
5 "graveyard" death

All plant specimens collected during the field survey were dried and processed in accordance with the requirements of the Western Australian Herbarium (WAH). All plant specimens were identified through comparisons with pressed specimens housed at the WAH. Where appropriate, plant taxonomists with specialist skills were consulted. Nomenclature of the species recorded is in accordance with the WAH (1998-).

4. DESKTOP FINDINGS

The climate, geology, soils and landforms all influence the vegetation of the area and are described in this section. Potential flora, including threatened, priority and introduced species are described, along with possible vegetation communities, and placed within a local and regional context.

4.1. Climate

Havel (1975a) characterised the climate of the Northern Jarrah Forest as typically Mediterranean with a predominance of winter rainfall. Beard (1990) subsequently described the climate of the Dale Botanical Subdistrict (within the Northern Jarrah Forest subregion) as somewhat drier than the Southern Jarrah Forest which has an average rainfall of 600 – 1200 mm per annum. The average minimum and maximum temperatures for Wandering for September to December in recent years were slightly variable when compared with the long term average (LTA) minima and maxima (Figure 3a).

The main trends in the last two years compared with 2021 are the lack of the extreme events in July 2022 and July 2023 in winter months and also the lower rainfall in October and November which may be critical for the seedlings in the early establishment period. Total rainfall recorded for Marradong for the year 2022 was 565.2mm and for 2023 was 523.8 which indicates that the rainfall recordings in 2022 and 2023 were lower than the long term average of 718.2 at Marradong (Bureau of Meteorology 2024), Figure 3b.

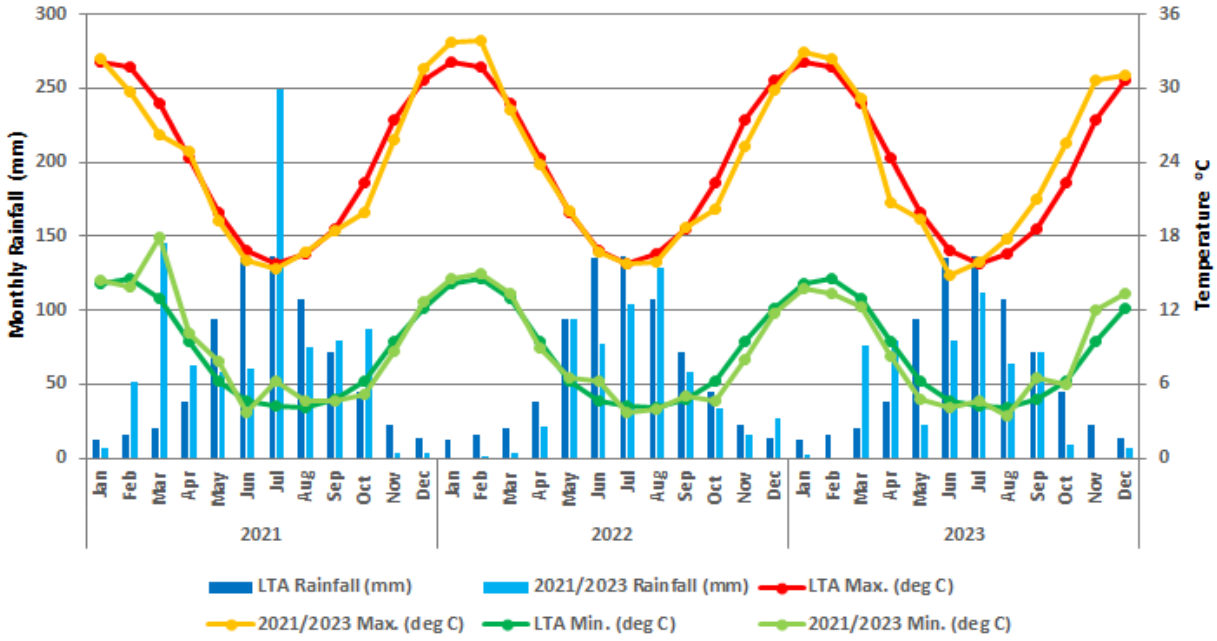


Figure 3a: Rainfall and temperature data for the Marradong and Wandering weather stations

Note: Long term average (LTA) rainfall (Bannister) and temperature (Wandering) data, together with monthly rainfall and average maximum and minimum temperature data for the period January 2021 to December 2023 are shown (Bureau of Meteorology 2024).

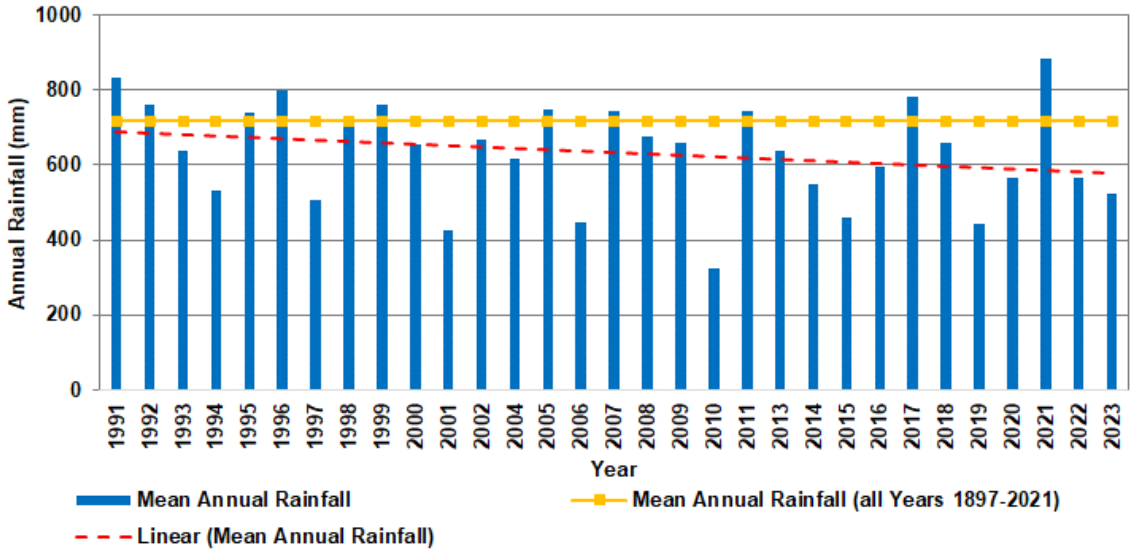
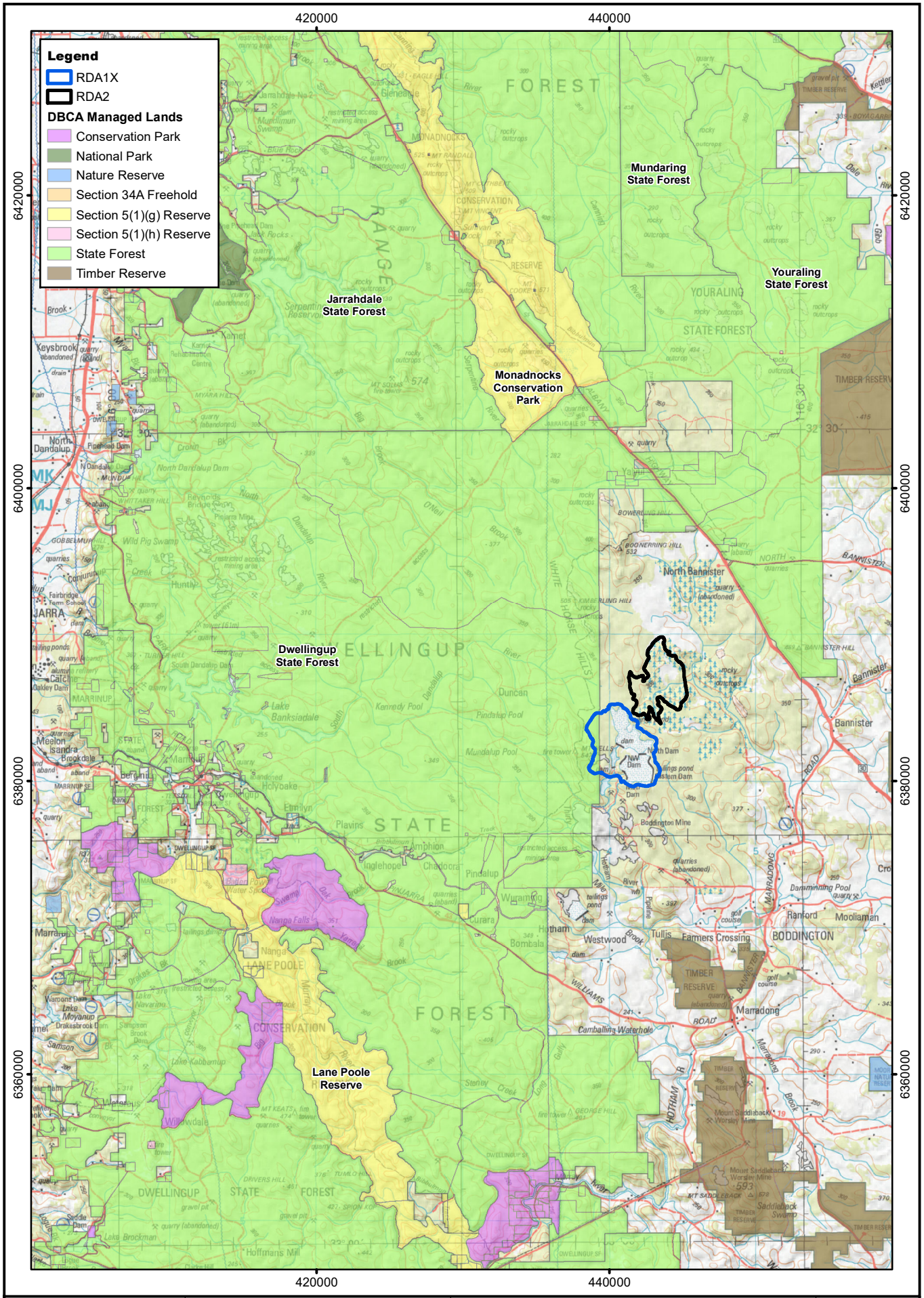


Figure 3b: Long Term Rainfall trends at Marradong (1991 to 2023) weather station

4.2. DBCA Estate and Land Tenures

The southern Residue Expansion areas overlaps a small section of the Dwellingup State Forest (221.78ha of the 1916.04ha within the southern residue area), Figure 4. The areas are located south of Albany Highway and north-west of the township of Boddington.



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28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640

Author: E M Matttiske | MCPL Ref:

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Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

RDA1X & RDA2 Survey Areas
DBCA Managed Lands

Figure: **4**

4.3. Geology, Soils and Topography

The Residue Expansion survey areas are situated within Beard's (1990) Northern Jarrah Forest subregion of the Southwest Province. The Northern Jarrah Forest subregion encompasses the area to the east of the Darling Scarp, overlying Archaean granite and metamorphic rocks of the Yilgarn Craton at an average elevation of 300 m (Beard 1990). The area is capped by extensive lateritic duricrust, dissected by drainage lines and broken by occasional granite hills. In the eastern section, the laterite becomes deeply dissected until it compresses isolated remnants. The duricrusted plateau of the Yilgarn Craton is characterised by lateritic gravels, consisting of 5m or more of ironstone gravels in a yellow sandy matrix, and related lateritic podzolic soils with ironstone gravels in a sandy surface horizon. These overlay mottled yellow-brown clay subsoils and hard setting loamy soils, which become evident in the east (Beard 1990).

Furthermore, Western Australia is divided into twelve Systems, separated by natural and demographic boundaries (Department of Conservation and Environment 1980). The survey area lies within the Darling System (as known as System 6), which is further divided into provinces, with the survey area lying in The Darling Plateau province (Department of Conservation and Environment 1980).

The underlying geological units of the Darling Plateau province have been defined by Churchward and McArthur (1980), with five main landform and soil units occurring within the survey areas (swamps were defined within mainly the Pindalup units in these survey areas), these are:

Dwellingup: Gently undulating landscape with duricrust on ridges; sands and gravels in shallow depressions.

Pindalup: Valleys of the central part of the plateau; gravelly duplex soils on slopes; some rock outcrop, grey sands, duplex yellow soils and orange earths in broad floor(s).

Coolakin: Valleys of the eastern art of the plateau; sandy and gravelly duplex soils on the slopes; narrow valley floors, some rock outcrop.

Cooke: Hills rising above general plateau level; mainly mantled by laterite with some rock outcrop.

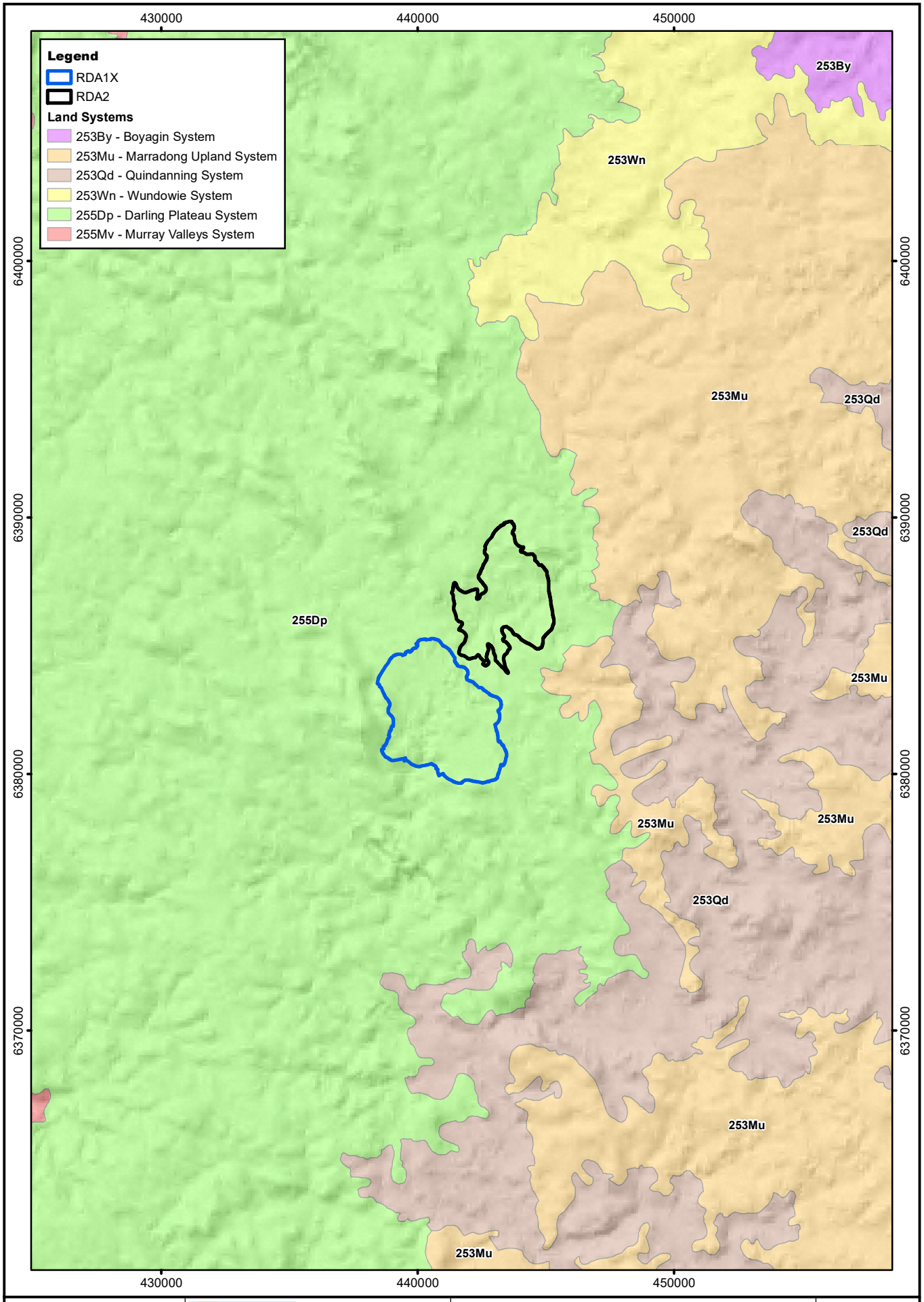
Swamp: Flat swamp floors with orange earths and smooth slopes with gravelly sands.

The Department of Primary Industries and Regional Development's (DPIRD) Land Systems present within the Residue Expansion survey areas (Figure 5, Table 1) includes the Darling Plateau System (255Dp);

1. **Darling Plateau System (255Dp):** Lateritic plateau. Duplex sandy gravels, loamy gravels and wet soils. Jarrah-marri-wandoo forest and woodland.

Table 1: Extent of Land Systems intersecting the Residue Expansion survey areas

Land System	Mapping Unit	Total Extent (ha)	Northern Area of Intersection with the Residue Expansion survey area	Northern Area Proportion of Current Extent (%)	Southern Area of Intersection with the Residue Expansion survey area	Southern Area Proportion of Current Extent (%)
Darling Plateau System	255Dp	820265.7327	1275.58	0.16%	1916.04	0.23%



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Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

RDA1X & RDA2 Survey Areas
Land Systems

Figure: **5**

4.4. Regional Vegetation

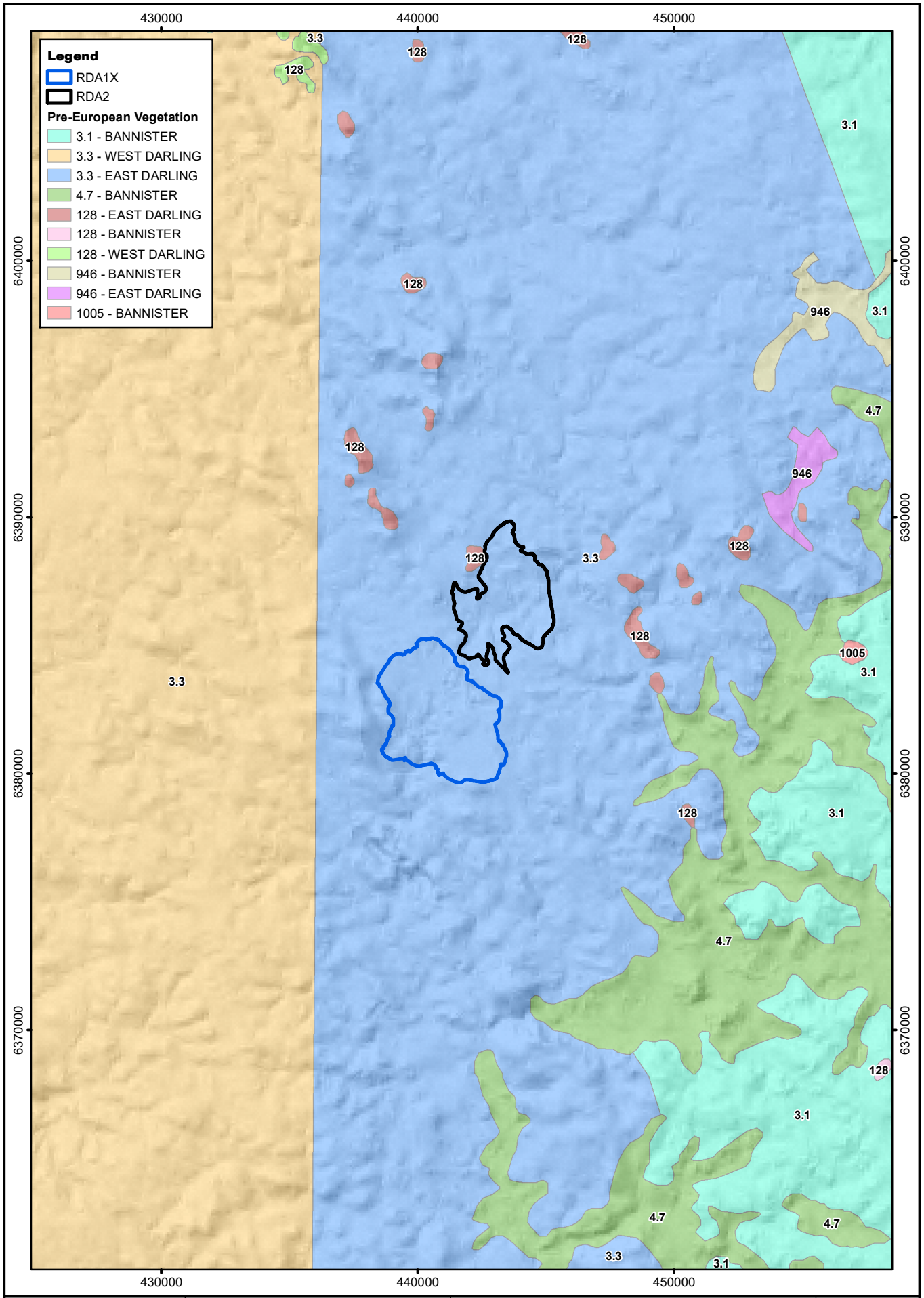
The survey area is situated within Beard's (1990) Northern Jarrah Forest subregion of the Southwest Province. The Northern Jarrah Forest subregion is characterised by Jarrah (*Eucalyptus marginata*) forest on ironstone gravels and Marri-Wandoo (*Corymbia calophylla* - *Eucalyptus wandoo*) woodlands on loamy soils, with sclerophyll understoreys. Dell and Havel (1989) broadly classified the Jarrah Forest as an open forest in its northern extent and as a tall forest in its southern extent. In lower rainfall areas towards the east trees decrease in size, forming woodlands or low forests. This dry sclerophyllous forest typically comprises a dominant *Eucalyptus marginata* and *Corymbia calophylla* overstorey, a mid-storey of *Allocasuarina fraseriana* (Sheoak), *Banksia grandis* (Bull Banksia), *Persoonia longifolia* (Snottygobble), *Persoonia elliptica* (Spreading Snottygobble), and a groundcover of woody shrubs with grass trees *Xanthorrhoea preissii*, *Kingia australis* and the cycad *Macrozamia riedlei* (Dell and Havel 1989).

The Pre-European vegetation systems present within the Residue Expansion survey areas (Figure 6, Table 2) include:

1. **East Darling System - Vegetation Association 3.3:** Mainly jarrah and marri *Eucalyptus marginata, Corymbia calophylla*

Table 2: Extent of Pre-European vegetation associations intersecting the Residue Expansion survey areas

System	Vegetation Association	State-wide Pre-European Extent (ha)	Northern Area of Intersection with the Residue Expansion survey area	Northern Area Proportion of Current Extent (%)	Southern Area of Intersection with the Residue Expansion survey area	Southern Area Proportion of Current Extent (%)
East Darling	3.3	303349.645	1275.58	0.42%	1916.04	063%



N

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Scale: 1:200,000
MGA94 (Zone 50)

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Mattiske Consulting Pty Ltd
28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640
Author: E M Matttiske | MCPL Ref:
Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

RDA1X & RDA2 Survey Areas
Pre-European Vegetation

Figure: **6**

Heddle *et al*. (1980) defined and described the dominant pre-European vegetation of the Darling System in a series of vegetation complexes as part of the System 6 studies. Mattiske and Havel (1998) updated this initial more restricted mapping coverage to the wider south-west forest region as (Regional Forest Agreement vegetation complexes). Havel, J.J. (2000) summarized in greater detail the relationships between the landforms, soils and climatic conditions. Mattiske and Havel (1998) defined and described five vegetation complexes in the Residue Expansion survey areas (Figure 7, Table 3). These include:

Cooke (Ce): Vegetation ranges from open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on deep soils through closed heath of Myrtaceae - Proteaceae species and lithic complex on granite rocks and associated soils in all climate zones, with some *Eucalyptus laeliae*, and *Allocasuarina huegeliana* and *Eucalyptus wandoo* in drier areas.

Dwellingup 4 (D4): Open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on lateritic uplands.

Pindalup (Pn): Open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on slopes and open woodland of *Eucalyptus wandoo* with some *Eucalypts patens* in the lower gullies.

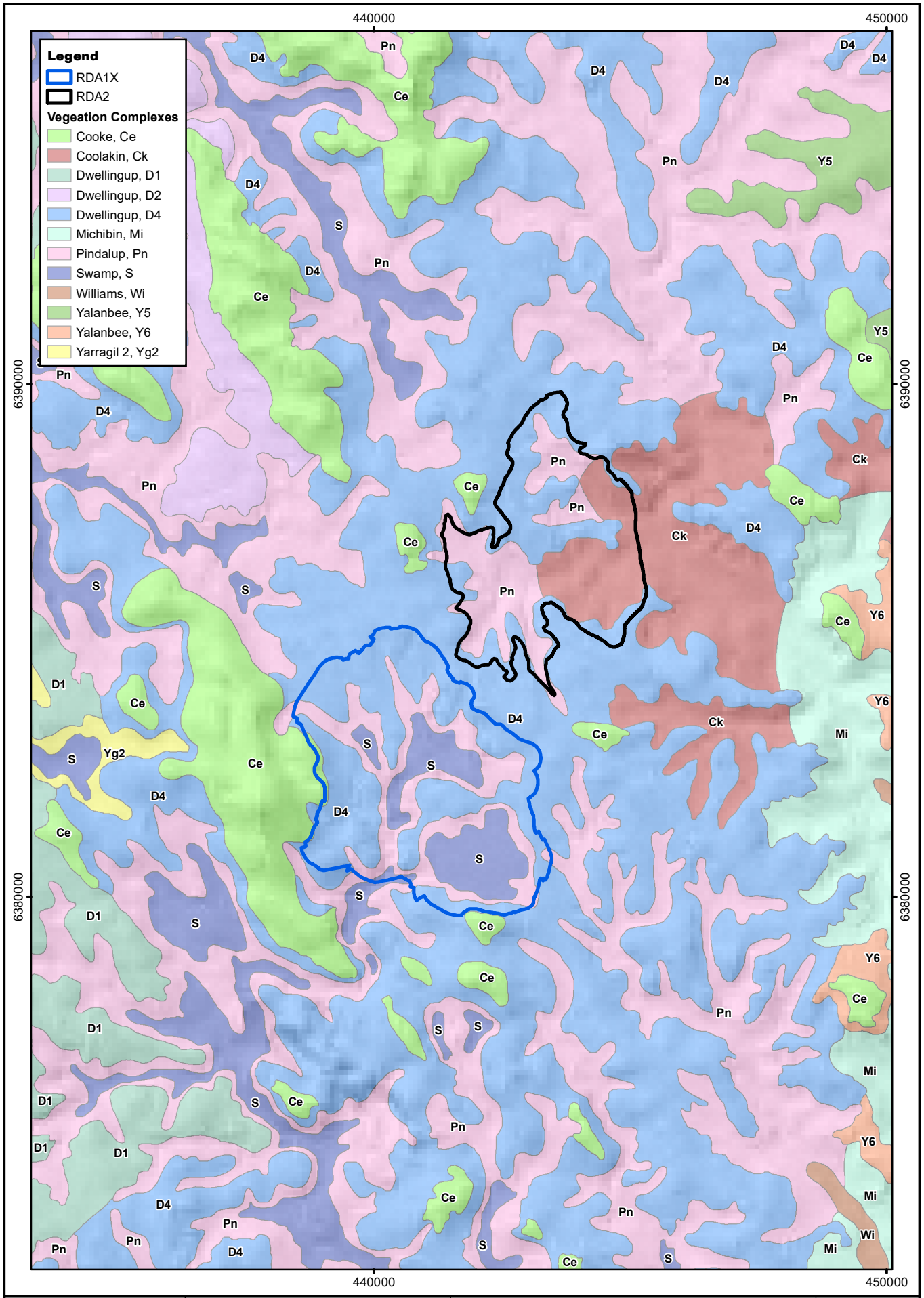
Coolakin (Ck): Woodland of *Eucalyptus wandoo* with admixture of *Eucalyptus patens and Eucalyptus marginata.*

Swamp (S): Vegetation ranges from low open woodland of *Melaleuca preissiana-Banksia littoralis* to sedgelands.

Table 3: Extent of Vegetation Complexes intersecting the Residue Expansion survey areas

Vegetation Complex	Vegetation Class	Total Extent (ha)	Northern Area of Intersection with the Residue Expansion survey area	Northern Area Proportion of Current Extent (%)	Southern Area of Intersection with the Residue Expansion survey area	Southern Area Proportion of Current Extent (%)
Cooke	Ce	51872.103	-	-	17.73	0.03%
Dwellingup 4	D4	187588.996	461.82	0.25%	970.92	0.52%
Pindalup	Pn	236540.595	453.58	0.19%	519.04	0.22%
Coolakin	Ck	229556.298	360.17	0.16%	-	-
Swamp	S	76245.982	-	-	408.35	0.54%

More recently, the vegetation of Western Australia has been assigned to bioregions and subregions under the Interim Biogeographical Regionalisation for Australia (IBRA), with the survey area falling within the Northern Jarrah Forest subregion (JF1) of the Jarrah Forest (JAF) Region (Thackway and Cresswell 1995). The vegetation of the Northern Jarrah Forest subregion consists of Jarrah – Marri forest, with Bullich and Blackbutt in the valleys to the west, grading to Wandoo and Marri woodlands to the east. Heath vegetation is the common understorey of forests and woodlands and occurs on granite rocks. The majority of the diversity between communities in this subregion occurs on lower slopes and near granite soils (Williams and Mitchell 2001).



N

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Scale: 1:100,000
MGA94 (Zone 50)

CAD Ref: g1881_F041_07

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Mattiske Consulting Pty Ltd
28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640
Author: E M Matttiske | MCPL Ref:
Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

RDA1X & RDA2 Survey Areas
Vegetation Complexes

Figure: **7**

4.5. Potential Flora

A total of 520 vascular plant taxa, representative of 217 genera and 73 families, have the potential to occur within the Residue Survey Areas. Appendix B. The most commonly represented families were Fabaceae (74 taxa), Proteaceae (40 taxa) and Myrtaceae (37 taxa). The most commonly represented genera in the survey areas were *Acacia* (25 taxa), *Hibbertia* (14 taxa) and *Lomandra* (11 taxa).

4.6. Potential Threatened and Priority Flora

Nine threatened species have a potential to occur in the survey areas (namely – *Caladenia hopperiana, Caladenia dorrienii, Pultenaea pauciflora, Eleocharis keigheryi, Morelotia australiensis, Andersonia sp. Saxatilis (F. & J. Hort 3324), Verticordia fimbrilepis subsp. fimbrilepis, Diuris micrantha, Anthocercis gracilis),* pursuant to section 179 of the *EPBC Act* and as listed by DCCEEW (2024a) and pursuant to Part 2, Division 1 and Subdivision 2 of the *BC Act* and as listed by DBCA (2024), Appendices B and C. Based on local landforms, soils and distribution patterns on the basis of previous studies and information on Florabase (Western Australian Herbarium 1998-). Of these nine potential species only four have a low-moderate potential to occur in the two potential residue areas, namely - *Andersonia sp. Saxatilis (F.J. Hort 3324), Caladenia dorrienii, Caladenia hopperiana and Morelotia australiensis).*

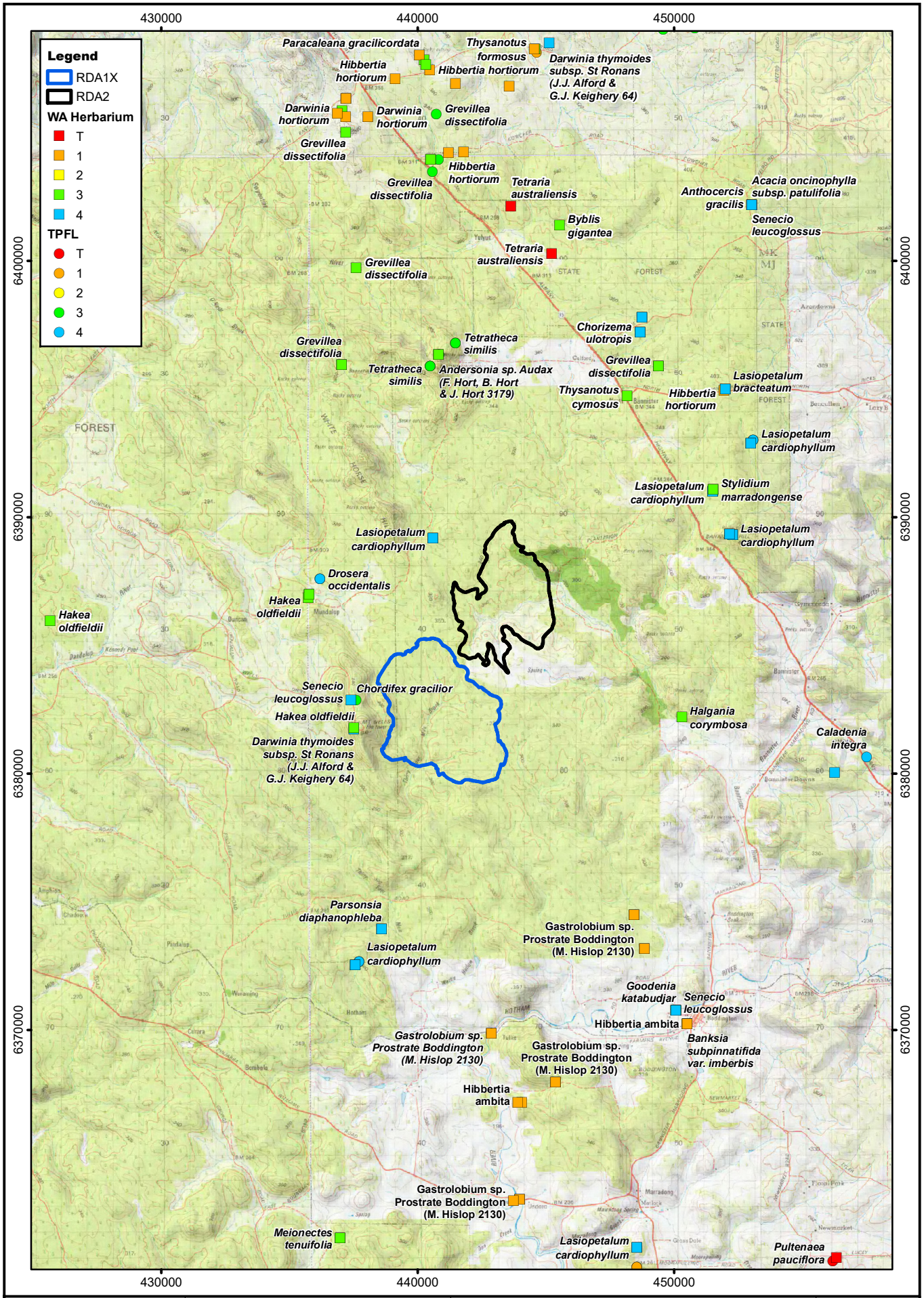
A total of forty-five priority flora species as listed by DBCA (2024a), most have a low or very low potential and only three Priority 1 species has a moderate or moderate-high potential. Four Priority 3 species have a moderate to moderate-high potential to occur and three Priority 4 have a moderate to moderate-high potential to occur in the survey areas.

All potential threatened and priority flora are listed in Appendix C, along with their State and Federal Conservation Codes (see Appendix A for definitions), a description and an assessment of the likelihood of their occurrence in the survey areas, Figure 8.

The likelihood that these species would occur within the survey area was determined using the following criteria:

- Known records within a 10 km radius of the centre of the survey area (as described above) and including information obtained from the paid search results. More recent, proximal and numerous records were ranked higher.
- Potential presence of suitable habitat and landforms for the species within the survey area (e.g. soil type, bedrock type, topography, drainage lines, vegetation).

The likelihood was ranked Very Low, Low, Low-Moderate, Moderate, Moderate-High, Appendix C. Records that have been documented either within or in close proximity of the survey areas were ranked as Moderate or High.



N

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Scale: 1:200,000
MGA94 (Zone 50)

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Mattiske Consulting Pty Ltd

28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640

Author: E M Matttiske | MCPL Ref:

Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

RDA1X & RDA2 Survey Areas
DBCA Threatened & Priority

Figure: **8**

4.7. Potential Introduced (Weed) Species and Declared Pest (Plant) Organisms

A total of 55 introduced taxa (including two planted species and 53 introduced species) may potentially exist in the Residue Expansion survey areas, based on NatureMap (DBCA 2007-) and records from Mattiske Consulting Pty Ltd (early 1980's-2023). None of the introduced species are listed as a Weed of National Significance (DCCEEW, 2024b). Two are listed as declared under the *Biosecurity and Agriculture Management Act 2007* (WA) (DPIRD 2024).

Two are listed as declared under the *Biosecurity and Agriculture Management Act 2007* (WA) (DPIRD 2023), Table 4.

Table 4: Ecological Impact and Invasiveness rankings for Introduced (Weed) Species potentially occurring within the Residue Expansion survey areas

Note: [1]Department of Parks and Wildlife (DPAW 2023), [2]West Australian Organism List (DPIRD 2024), [2]Weeds of National Significance (DCCEEW 2024b)

Species Name	DPAW[1]		WAOL[2]	Declared pest[3]
	Ecological Impact	Invasiveness Ranking		
**Aira caryophyllea*	Unknown	Rapid	Permitted - s11	-
**Allium triquetrum*	Low	Slow	Permitted – s11	-
**Arctotheca calendula*	Medium	Moderate	Permitted – s11	
**Avena barbata*	High	Rapid	Permitted – s11	-
**Bellardia trixago*	Unknown	Unknown	Permitted – s11	-
**Bellardia viscosa*	Unknown	Unknown	Permitted – s11	-
**Briza maxima*	Unknown	Rapid	Permitted - s11	-
**Briza minor*	Unknown	Rapid	Permitted - s11	-
**Bromus diandrus*	High	Rapid	Permitted – s11	-
**Bromus madritensis*	Unknown	Unknown	Permitted – s11	-
**Carex divisa*	High	Rapid	Permitted – s11	-
**Cotula turbinata*	Unknown	Rapid	Permitted - s11	-
**Disa bracteata*	Unknown	Rapid	Permitted - s11	-
**Ehrharta calycina*	Unknown	Moderate	Permitted - s11	-
**Ehrharta longiflora*	Unknown	Rapid	Permitted - s11	-
**Erigeron sumatrensis*	Unknown	Rapid	Permitted - s11	-
**Galium divaricatum*	Low	Unknown	Permitted - s11	-
**Geranium molle*	Unknown	Unknown	Permitted - s11	-
**Gladiolus tristis*	Low	Unknown	Permitted - s11	-
**Gomphocarpus fruticosus*	Unknown	Rapid	Declared Pest s22(2) (C3)	Declared
**Hordeum hystrix*	Low	Rapid	Permitted - s11	-
**Hypochaeris glabra*	Medium	Rapid	Permitted - s11	-
**Hypochaeris radicata*	Medium	Rapid	Permitted - s11	-
**Iridaceae* sp.	Unknown	Unknown	-	-
**Isolepis prolifera*	Unknown	Rapid	Permitted - s11	-
**Juncus acutus*	High	Rapid	Permitted - s11	-
**Juncus acutus* subsp. *acutus*	High	Rapid	Permitted - s11	-
**Juncus capitatus*	Low	Rapid	Permitted - s11	-
**Lamiaceae* sp.	Unknown	Unknown	-	-
**Lavandula stoechas*	Low	Moderate	Permitted - s11	-
**Lolium perenne*	Medium	Rapid	Permitted - s11	-
**Lolium rigidum*	Medium	Rapid	Permitted - s11	-
**Lotus subbiflorus*	Unknown	Rapid	Permitted - s11	-

Table 4: Ecological Impact and Invasiveness rankings for Introduced (Weed) Species potentially occurring within the Residue Expansion survey areas (continued)

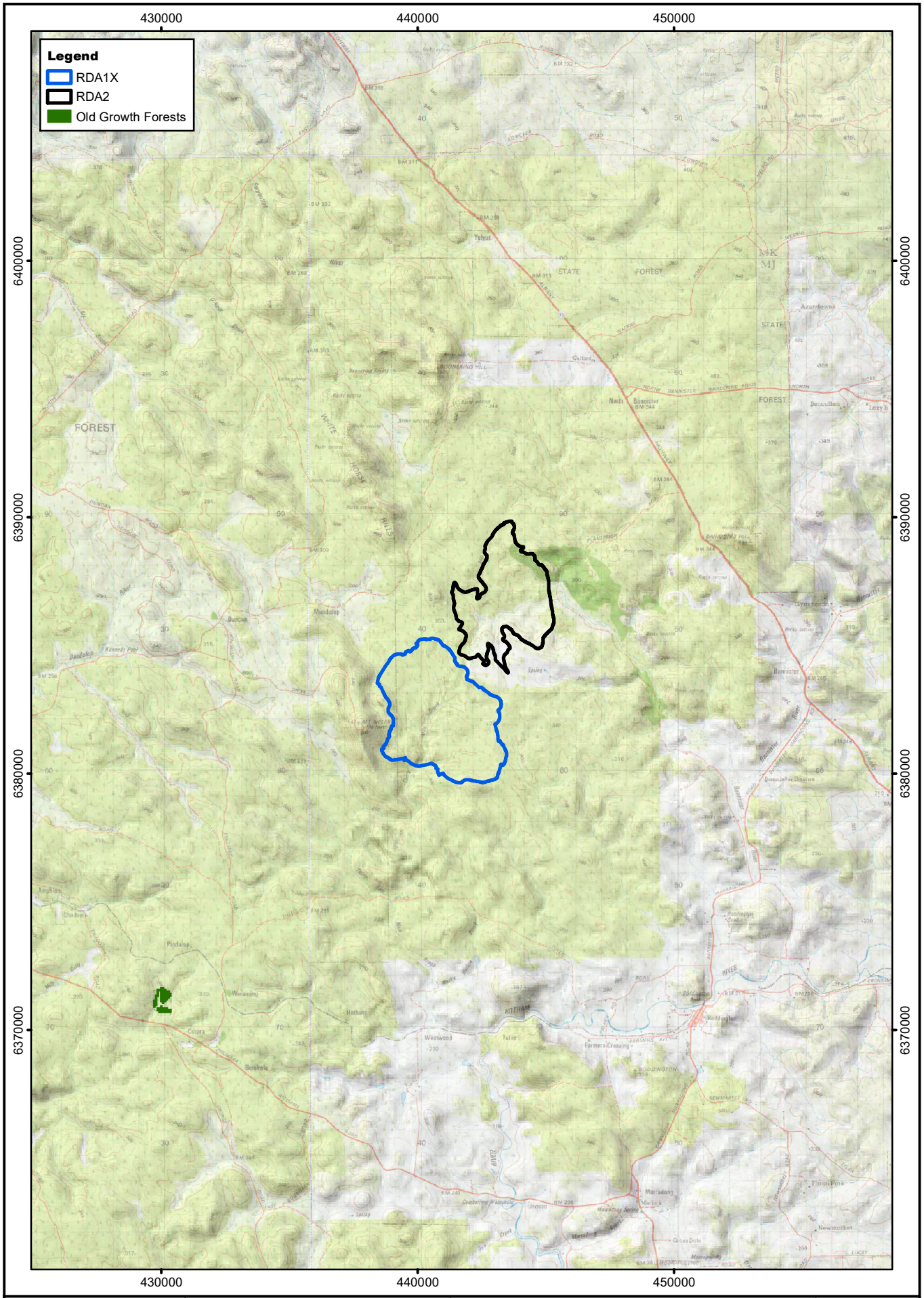
Note: [1]Department of Parks and Wildlife (DPAW 2023), [2]West Australian Organism List (DPIRD 2024), [2]Weeds of National Significance (DCCEEW 2024b)

Species Name	DPAW[1]		WAOL[2]	Declared pest[3]
	Ecological Impact	Invasiveness Ranking		
**Lysimachia arvensis*	Unknown	Rapid	Permitted - s11	-
**Moraea flaccida*	High	Modrate	Declared Pest s22(2) (Exempt)	Declared
**?Oenothera* sp.	Low	Slow-Rapid depending on species	Permitted - s11	-
**Orobanche minor*	Unknown	Rapid	Permitted - s11	-
**Oxalis corniculata*	Unknown	Unknown	Permitted – s11	-
**Petrorhagia dubia*	Unknown	Rapid	Permitted – s11	-
**Plantago lanceolata*	High	Unknown	Permitted – s11	-
**Polypogon monspeliensis*	Medium	Unknown	Permitted – s11	-
**Ranunculus muricatus*	Unknown	Rapid	Permitted – s11	-
**Romulea rosea*	High	Unknown	Permitted – s11	-
**Rumex obtusifolius* subsp. *obtusifolius*	Unknown	Unknown	Permitted – s11	-
**?Sagina* sp.	Unknown	Unknown	Permitted – s11	-
**Sonchus oleraceus*	Medium	Rapid	Permitted - s11	-
**Trifolium angustifolium*	Unknown	Unknown	Permitted - s11	-
**Trifolium arvense* var. *arvense*	Unknown	Unknown	Permitted - s11	-
**Trifolium campestre* var. *campestre*	Unknown	Unknown	Permitted - s11	-
**Trifolium dubium*	Unknown	Unknown	Permitted - s11	-
**Trifolium* sp.	Unknown	Unknown	Permitted - s11	-
**Ursinia anthemoides*	Unknown	Rapid	Permitted - s11	-
**Vulpia myuros*	Unknown	Rapid	Permitted - s11	-

4.8. Old Growth Forests

There are a few patches of old growth forests occurring south of Residue Expansion survey areas (Figure 9); however based on data supplied by the Department of Biodiversity, Conservation and Attractions no areas have been highlighted within survey areas.

The northern area is dominated by highly modified areas associated with a pine plantation operation by Mt Saddleback Tree Farrm (formerly Sotico and Bunning operations) and the southern area abuts the current residue dam and has been disturbed by tracks, exploration grid lines and previous logging operations.



N

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Scale: 1:200,000
MGA94 (Zone 50)

CAD Ref: g1881_F041_08

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Mattiske Consulting Pty Ltd
28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640

Author: E M Matttiske | MCPL Ref:

Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

RDA1X & RDA2 Survey Areas
Old Growth Forests

Figure: **9**

4.9. Groundwater Dependant Ecosystems

The potential groundwater dependent ecosystems were determined on the basis of the extent of the vegetation complexes such as the Swamp, Pindalup and Coolakin that occur within the survey areas. In view of the extensive flora and vegetation studies in the northern Jarrah Forest these vegetation complexes support species and site-vegetation types that prefer and occur on seasonally moister and wetter soils. This approach was considered to represent a precautionary approach in the absence of detailed groundwater level data at the time of selecting the potential groundwater dependent ecosystems at this juncture. Key indicator plant species that are generally accepted as indicators of moister soils and, hence, potential groundwater dependent ecosystems include – *Banksia littoralis, Acacia divergens, Thomasia paniculata, Astartea scoparia, Eucalyptus rudis, Hypocalymma angustifolium,* mixed *Melaleuca* species and *Taxandria linearifolia.*

4.10. Previous Surveys

Over the past forty years, Mattiske Consulting has previously mapped the flora and vegetation values associated with Newmont and South32 areas (Mattiske 1981 to 2023).

A series of vegetation plots have been established within the survey areas with the Saddleback Tree Farm, the Newmont survey areas and nearby former Alcoa Hedges operational areas (now under management of Newmont), the Hotham Farm, and South32 plots in Marradong, Mt Saddleback and Quindanning areas that as such provide a comprehensive coverage of the vegetation types on this eastern fringe of the northern Jarrah forest. As such the total range of permanent and monitoring plots in the respective areas is summarized in Table 5, along with the timing of assessments. Initially many of these consisted on 4 20m x 20m subplots within a 40m square plot and in more recent years the plots have been reduced to 20m x 20m.

The previous survey effort included the former gridding data collected on transects 100m apart (although in parts of the Newmont areas this was reduced to 25m spacing near the main operational pit area), the assessment of multitude plots both on the Newmont areas and the South32 areas near Boddington and the extensive flora work undertaken over the period form early 1980's to 2023. The extent of the coverage of the site-vegetation types is summarized in Table 5 and as such reflects the compliance and exceeds the expectations of the EPA (2016a and 2016b). In a few instances when less than 5 plots have been recorded, the latter is related to the eastern extension of a site-vegetation type from the western or central forests areas or where a community is restricted (local outcrop areas or impeded drainage areas).

Although some of the data is more than 5 or 10 years old in some regional areas, the extent and comprehensive coverage of the data is difficult to match elsewhere in Western Australia. Many of the plots have been monitored multiple times and as such provide temporal data sets for current and future reference and also some areas have been resampled along transects in recent years to assist in additional targeted work in the Boddington area.

Table 5: Summary of Vegetation Plots in the Boddington Area by Site-vegetation Type and Timing of Survey
Note : ST – Mt Saddleback Tree Farm (2011, 2012 and 2013; NBG and BG Newmont (1981-2013), RDA – Residue Dam Areas – Newmont (RDA01-RD12, 2009; RDA13-RDA24, 2010); ALC – Alcoa Hedges (H) ; S32 – South32 (1982 – 2023)

Site-Vegetation Type	Plot Code	Timing of Assessment	Client
A	B508S	Spring 1983	NBG
	QMP13, QMP14	Spring 1998, Spring 2019	S32
	H14	May 1989	ALC
	RDA01	Spring 2009	NBG
AX	BG01	Spring 2010	NBG
	H15	May 1989	ALC
AY	B503W	Spring 1983	NBG
	ST02	Nov 2011, Nov 2013	NBG
	BG11, BG18	Spring 2010	NBG
	RDA18, RDA22	Spring 2010	NBG
	QMP07, QMP05	Spring 1998, Spring 2019	S32
Y	B502Y	Spring 1983	NBG
	ST01, ST03, ST04, ST05, ST06,	Nov 2011, Nov 2013	NBG
	BG05	Baseline 1983 to 1996	NBG
	RDA11, RDA12	Spring 2009	NBG
	MBP8	Spring 1989	S32
	FMP24, FMP45, FMP 58, FMP77, FMP78, FMP79, FMP82	Baseline 1982	S32
	MMP2a	Spring 2007, 2012	S32
	QMP12	Spring 1989, 2019	S32
	H10, H12	May 1989	ALC
YG	FMP06, FMP09, FMP33	Baseline 1982	S32
L	BG17B, BG18	Baseline 1983 to 1996	NBG
AD	RDA16	Spring 2010	NBG
	FMP23	Baseline 1982	S32
D	ST07	Nov 2011, Nov 2013	NBG
	FMP02, FMP31, FMP66,FMP67, FMP71, FMP76	Baseline 1982	S32
	MBP2	Spring 1989	S32
	H4, H5	May 1989	ALC
G1	B501H	Spring 1983	NBG
	RDA15	Spring 2010	NBG
	ST10	Nov-Dec 2012, Nov 2013	NBG
	FMP07, FMP08, FMP42, FMP52, FMP68, FMP74	Baseline 1982	S32
	MBP9, MBP10	1989	S32
G2	FMP14	Baseline 1982	S32
	ST11	Nov-Dec 2012, Nov 2013	NBG
G3	BG08	Baseline 1983 to 1996	NBG
	RDA02	Spring 2009	NBG
	FMP10	Baseline 1982	S32
G4	FMP12, FMP13	Baseline 1982	S32
H	ST08, ST09	Nov 2011, Nov 2013	NBG
	ST12, ST13, ST14	Nov-Dec 2012, Nov 2013	NBG
	B504J, BG04	Spring 1983	NBG
	BG14, BG16, BG19	Spring 2010	NBG
	RDA03, RDA04, RDA05, RDA06, RDA07, RDA17, RDA20, RDA23	Spring 2009 to Spring 2010	NBG
	FMP05, FMP25, FMP26, FMP32, FMP41, FMP51, FMP53, FMP62, FMP69, FMP75, FMP80	Baseline 1982	S32
	FMP97, FMP101, FMP105, FMP106, FMP107, FMP108	Various plots at multiple times between 1998 and 2023	S32
	MMP12B, MMP12C	Spring 2007 and 2012	S32
	MBP6	Spring 1989	S32
H1	QMP02, QMP10	Various plots Spring 1998, 2019, 2023	S32
HG	QMP06	Spring 1998, 2019, 2023	S32
H2	ST15	Nov-Dec 2012, Nov 2013	NBG

Table 5: Summary of Permanent Plots in the Boddington Area by Site-vegetation Type and Timing of Survey
Note : ST – Mt Saddleback Tree Farm (2011, 2012 and 2013; NBG – Newmont (1983 to 1996), RDA – Residue Dam Areas – Newmont (RDA01-RD12, 2009 RDA13-RDA24, 2010); ALC – Alcoa Hedges; S32 – South32 (1980 – 2023)

Site-Vegetation Type	Plot Code	Timing of Assessment	Client
M	ST16, ST17	Nov-Dec 2012, Nov 2013	NBG
	RDA08, RD14	Spring 2009, Spring 2010	NBG
	FMP44, FMP56, FMP83, FMP84	Baseline 1982	S32
	MBP3	Spring 1989	S32
	H11, H13	May 1989	ALC
MG	RDA09, RDA21	Spring 2009, Spring 2010	NBG
	QMP04	Spring 1998, 2019	S32
M2	ST18, ST19	Nov-Dec 2012, Nov 2013	NBG
M3	RDA19	Spring 2010	NBG
Z	BG02	Baseline 1983 to 1996	NBG
	MBP01, MBP11	Spring 1989	S32
	H1, H6, H2, H9	May 1989	ALC
PS	ST20, ST21	Nov-Dec 2012, Nov 2013	NBG
	BG12, BG10	Spring 2010	NBG
	FMP16, FMP22	Baseline 1982	S32
	H3, H8	May 1989	ALC
P	B505J	Baseline 1983 to 1996	NBG
P	BG06, G11	Baseline 1983 to 1996	NBG
	RDA10, RDA13, RDA24	Spring 2009, Spring 2010	NBG
	FMP02, FMP04, FMP28, FMP34, FMP35, FMP49,, FMP59, FMP64, FMP65, FMP70	Baseline 1982	S32
	FMP86, FMP87, FMP93, FMP95, FMP100, FMP104, FMP110, FMP111	Various plots at multiple times between 1998 and 2023	S32
	MMP6A, MMP7A, FMP8A, FMP8B, MMP15A	Various plots at multiple times between 2007 and 2023	S32
	MBP07	Spring 1989	S32
	QMP01, QMP03, QMP08	Various plots Spring 1998, 2019, 2022 and 2023	S32
O (variant of S)	H7	May 1989	ALC
S	B506J	Spring 1983	NBG
S	BG03, BG13, BG15	Spring 2009, 2010	NBG
	FMP01, FMP21, FMP27, FMP30, FMP39, FMP40, FMP50, FMP55, FMP57, FMP61, FMP63, FMP81	Baseline 1982	S32
	FMP85, FMP89, FMP92, FMP94, FMP98, FMP102, FMP109, FMP114	Various plots at multiple times between 1994 and 2023	S32
	MMP5A, FMP10A, FMP13A, FMP16A	Various plots at multiple times between 2007 and 2012	S32
	MBP05	Spring 1989	S32
ST	B507J	Spring 1983	NBG
	MBP4	Spring 1989	S32
	FMP11, FMP36, FMP43, FMP46, FMP54, FMP73	Baseline 1982	S32
	FMP88, FMP99, FMP91, FMP96, FMP99, FMP103, FMP112	Various plots at multiple times between 1994 and 2023	S32
	MMP4A, MMP17A	Various plots at multiple times between 2007 and 2023	S32

4.11. Potential Threatened and Priority Ecological Communities

No Threatened Ecological Communities (TECs) are likely to occur in the Residue Expansion survey areas (DBCA 2024a).

The regional desktop assessment highlighted several potential TECs including:

. the *Banksia Woodlands of the Swan Coastal Plain* that is restricted to the Swan Coastal Plain and as such do not extend into the Jarrah forest area on the Darling Ranges. As reflected in the IBRA regions of Australia, the Swan Coastal Plain has been defined by Thackway and Cresswell (1995) well west of the Newmont Boddington project areas.

. the *Eucalypt Woodlands of the Western Australian Wheatbelt* that is restricted to the eastern fringes of the northern Jarrh Forest on the interface with the Wheatbelt. These woodlands as defined by DCCEEW (2024b) do not occur in the Saddleback Tree Farm and as such do not extend into the Residue Expansion survey areas.

There is potential that the granite areas (G1 and G3) as recorded in small areas in the Residue Expansion survey areas may have values that overlap with the PEC defined for similar communities south of Boddington (DBCA PEC Mount Saddleback Heath Communities PEC (P1), DBCA 2023b). The Priority 1 PEC - Mt Saddleback Heath Communities, as delineated by DBCA, occurs in the Saddleback area near Boddington. This PEC community on Mt Saddleback has affinities with selected components of the site-vegetation type G as defined by Havel (1975b) and as refined and split into site-vegetation types G1, G2, G3, G4 and G5 by Mattiske in the northern Jarrah Forest areas and more specifically G1, G3 and G4 in the PAA areas by Mattiske (Worsley Alumina Pty Ltd 1985 to Mattiske Consulting 2021).

The Residue Expansion survey areas occur within the Regional Forest Agreement (RFA) area of the southwest forests and as such was considered during the RFA process.

4.12. Wetlands of International Importance (Ramsar)

No wetlands of international importance listed at Commonwealth level pursuant to sections 181 and 182 of the *EPBC Act* and listed by the DCCEEW (2023a) occur within the Residue Expansion survey areas. The closest wetlands of international importance is the Peel- Yalgorup System.

5. PREVIOUS STUDIES FINDINGS

5.1. Survey Effort

The survey efforts has been undertaken over a decade from multiple studies within the Boddington survey areas. The survey effort over decades and on multiple occasions leads to the conclusion that the work exceeds the current EPA Guidance Statement (2016a and 2016b) expectations for flora and vegetation studies.

The survey effort has included:

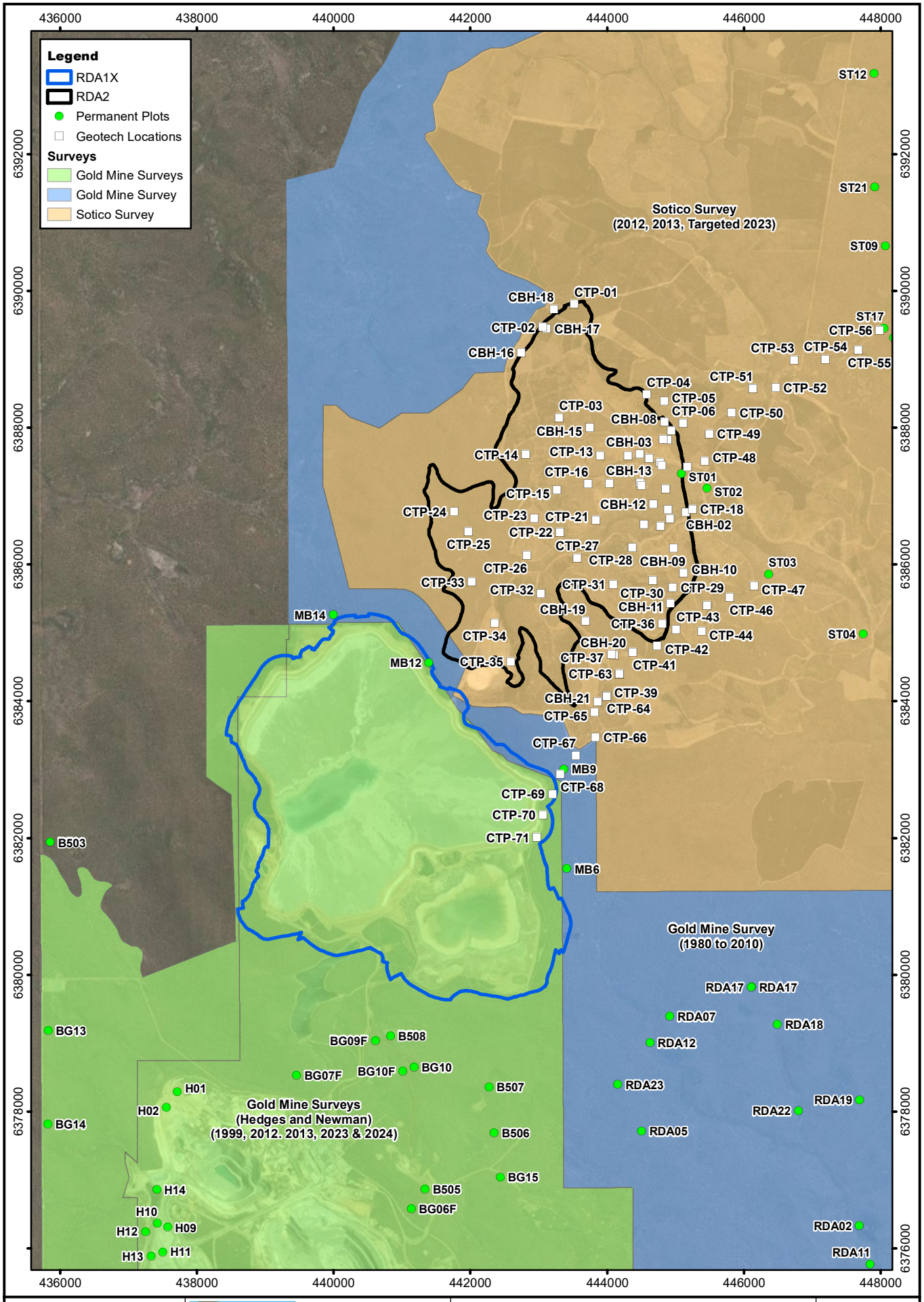
- Foot transects which includes the mapping efforts and targeted searches over several decades including in the period from recent work in the spring months of 2023 within the two residue areas supporting native vegetation and the Geotech areas (Figure 10).
- Multiple recording sites between 1982 and 2021 on a grid system which varied slightly from 120m x 120m with some sites closer than this average and some slightly wider. This pattern of recording is consistent with previous ecological studies in the northern Jarrah forest.
- Targeted searches of additional extreme sites that are variable within the valleys, swamps and outcrop areas. The coverage of the flora on the granite and swamp areas relied on the recording sites and targeted searching;
- Detailed and consistent data collection on position in the landscape, soils, flora, vegetation and vegetation condition.
- Consistent interpretation in line with previous site-vegetation studies where there is a greater reliance on key indicator species and a series of site parameters rather than the accepted clustering and groupings. Such an approach differs from the EPA guidance statement, but if the latter was followed the dominance of some tree and understorey species in the analyses would lead to a less comprehensive delineation of biodiversity values and also be inconsistent with the approach adopted on all other leases in the northern Jarrah forest where detailed flora and vegetation studies have been undertaken in the past by the Mattiske team and site personnel. In summary, the survey effort easily exceeds the expectations of the EPA Guidance Statement (2016a, 2016b).

The range of permanent and monitoring plots in the respective areas is summarized in Section 4.10. above, along with the timing of assessments, with the majority of the plot assessments in the spring months which aligns with the more recent EPA standards (EPA 2016a, 2016b). There has been additional work being undertaken in nearby areas during 2024.

A general assessment was made of the current survey efforts against a range of factors that may have limited the outcomes and conclusions of this report (Table 6).

Table 6: Potential flora and vegetation survey limitations for the Boddington survey areas

Potential Survey Limitation	Impact on Survey
Sources of information and availability of contextual information (*i.e.* pre-existing background versus new material)	**Not a constraint:** Reference resources such as mapping by Beard (1979), Mattiske and Havel (1998), previous vegetation mapping completed for Newmont and South32 by E.M Mattiske and Associates and Mattiske Consulting Pty Ltd teams together with online flora and vegetation information, has provided an appropriate level of information for the current survey.
Scope (*i.e.* what life forms, *etc.*, were sampled)	**Not a constraint:** Vascular flora, which were the focus of the present survey was sampled on a close grid pattern within the survey area. In addition to the regular sampling sites, searches were undertaken to assess the likelihood of threatened and priority flora species in 2012, 2013 and 2023.
Proportion of flora collected and identified (based on sampling, timing and intensity)	**Not a constraint:** The survey areas on the Residue Expansion survey areas have been sampled over multiple years. The botanists undertaking the field surveys have had extensive experience working with the flora of the Jarrah forest. Any flora which could not be identified in the field was collected for subsequent identification. A few taxa were only recorded at genus level as flowering was not occurring.
Mapping reliability	**Not a constraint:** The vegetation was mainly assessed on a 100m x 100m grid pattern (or closer in some areas) within the survey areas. This together with targeted and opportunistic survey sites (particularly near the granites and swamp areas) enabled intensive coverage of the values on the Residue Expansion survey areas and therefore the associated mapping of key flora values and the site-vegetation types with a high level of confidence.
Timing, weather, season, cycle	**Not a constraint:** The EPA (2016a) recommends that flora and vegetation surveys in the South – West Botanical Province be conducted in Spring (September-November). The intensive work has been undertaken over multiple seasons, and largely in spring months, The detailed survey work commenced in early 1980's and continued through multiple years to early 2021 on the survey areas. In view of extensive work in the areas adjacent to the survey areas this is considered not to be a constraint.
Disturbances (fire flood, accidental human intervention, *etc*.)	**Not a constraint:** With the exception of previous logging activities and occasional old forestry tracks, the vegetation of the survey area is largely undisturbed. Many of the areas have been previously disturbed for tailings dams, pine plantations and exploration tracks. In view of the >40 years of experience by Dr Mattiske in northern Jarrah forest vegetation mapping the latter is not considered to lead to any constraints.
Access problems (*i.e.* ability to access survey area)	**Not a constraint:** Vehicle access through the Residue Expansion survey areas was only restricted in small sections and all areas were accessible on foot.
Experience levels (*e.g.* degree of expertise in plant identification to taxon level)	**Not a constraint:** All botanists had direct and recent experience working in the Jarrah Forest and working for Newmont and South32 and a range of other clients, and thus were familiar with the local flora and vegetation values. Dr Mattiske has more than 40 years of ecological experience in flora and vegetation studies in the southwest forests at a detailed floristic level, as well as detailed and regional vegetation assessment level.



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Scale: 1:75,000
MGA94 (Zone 50)

CAD Ref: g1881_F041_11

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Mattiske Consulting Pty Ltd
28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640
Author: E M Matttiske | MCPL Ref:
Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

RDA1X & RDA2 Survey Areas
Survey Effort

Figure:
10

5.2. Flora

The range of flora collected on the survey areas is summarized in Table 7 and Appendix B. The recordings on the grids was undertaken over multiple months the coverage of the flora in more diverse and spatially more complex areas such as the swamps, broad valley systems, slopes and ridges was considered to be comprehensive.

A total of 520 vascular plant taxa, representative of 217 genera and 73 families, have the potential to occur within the Residue Survey Areas. The most commonly represented families were Fabaceae (74 taxa), Proteaceae (40 taxa) and Myrtaceae (37 taxa). The most commonly represented genera in the survey areas were *Acacia* (25 taxa), *Hibbertia* (14 taxa) and *Lomandra* (11 taxa).

A total of 272 vascular plant taxa, representative of 143 genera and 56 families, have been recorded in the survey areas between 2012 and 2023 within the Residue Survey Areas and adjacent areas.

Table 7: Summary of Flora Species on Boddington survey areas (see Appendix B)

Source	Families	Genera	Native Taxa	Introduced Taxa and Planted Taxa
Potential and recorded Species in Boddington area (see Appendix B)	73	217	520	55
Recorded species in the Sotico (Mt Saddleback Tree Farm studies 2012, 2013, and recent targeted studies in 2023)	56	143	272	33

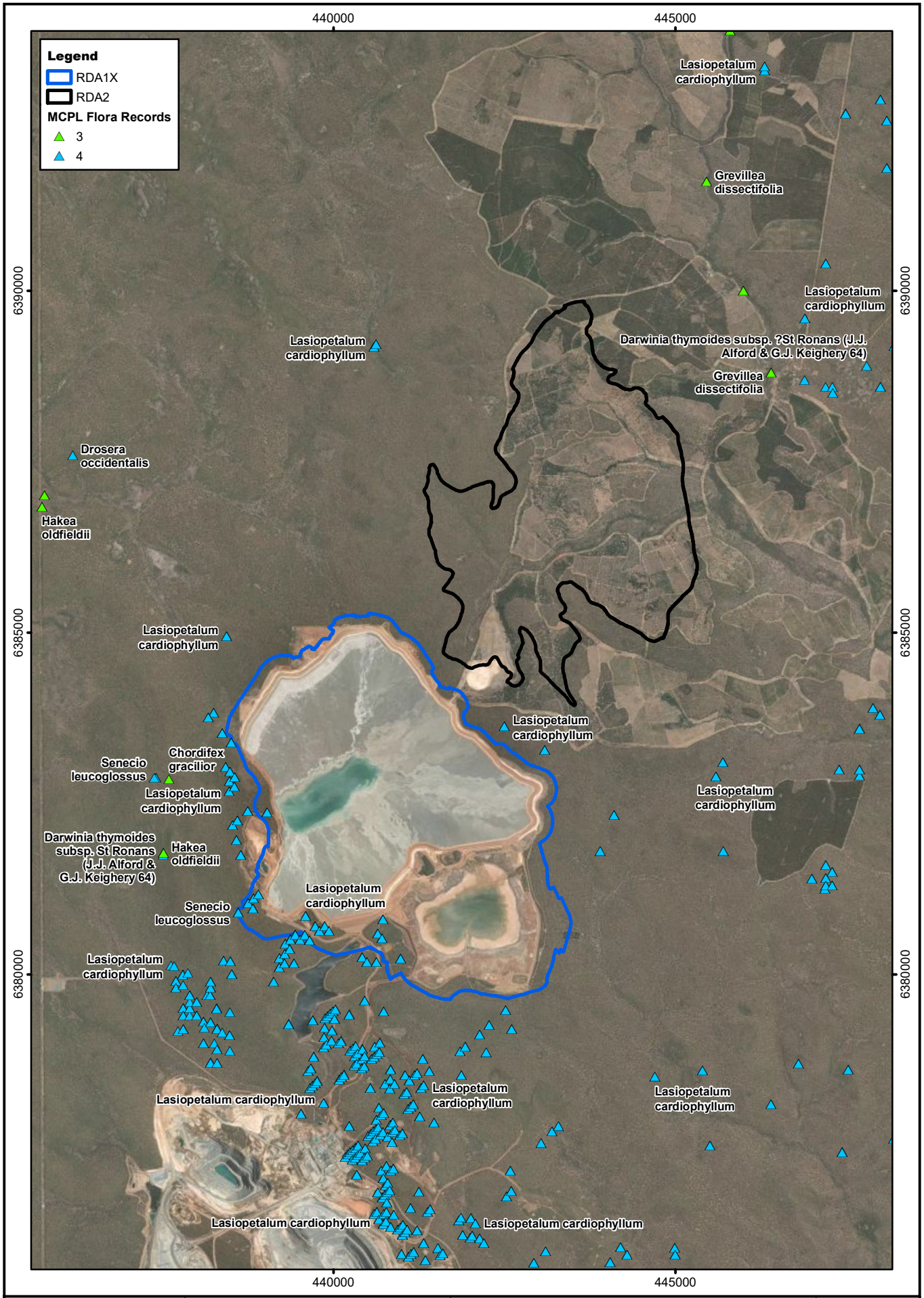
Of interest is the shift in landforms and soils across the survey areas and the latter is reflected in the change in the dominance of flora species that tolerate the lateritic uplands, gullies and outcrop areas.

5.3. Threatened and Priority Flora

No threatened flora within current listings by the Department of Biodiversity, Conservation and Attractions (DBCA 2024) and by the Department of Climate Change, Energy and the Environment and Water [DCCEEW] (2024a) under the EPBC Act 1999 were recorded in either of the residue areas.

A range of priority flora as listed by (DBCA 2024) and WA Herbarium (1998-) have been recorded within the wider Sotico and Boddington Gold Mine areas surrounding the two residue areas (Figure 11). Two priority flora species occur within the Residue areas (Figure 11), namely:

- *Lasiopetalum cardiophyllum* (P4) – this species is relatively locally common within the Jarrah-Marri-Sheoak (*Eucalyptus marginata – Corymbia calophylla – Allocasuarina fraseriana*) communities near Boddington and as such is relatively restricted geographically. In view of the degree of clearing in the residue areas this species is relatively restricted to the fringes of the southern residue area.
- *Senecio leucoglossus* (P4) – this species is widespread in the northern Jarrah but occurs as scattered individuals. This species was recorded on the western fringes of the southern residue survey area.



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Scale: 1:75,000
MGA94 (Zone 50)

CAD Ref: g1881_F041_10

Date: September 2024 | Rev: B | A4

Mattiske Consulting Pty Ltd

28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640

Author: E M Matttiske | MCPL Ref:

Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

RDA1X & RDA2 Survey Areas
MCPL Flora Records

Figure:

11

5.4. Site-vegetation Types

A total of 20 site-vegetation types, plus 2 cleared (ag – agriculture and other), 1 plantation (pine trees) and 1 plantation (agricultural areas) were defined and mapped in the Residue Expansion survey areas, Table 8 and Figure 12. The site-vegetation types were subdivided into four main groupings associated with site conditions which reflected landforms, soils and soil moisture levels, Table 8. The site-vegetation types on the extreme sites such as on the valley systems, granite outcrop areas and the creeklines differ markedly from the forest and woodland areas on the slopes and ridges.

The delineation of the site-vegetation types was based on the earlier work of Havel (1975a and 1975b) and as such rely on key site and species indicators. Whilst Mattiske has refined these initial site-vegetation types there is still a reliance on the original work of Havel (1975a and 1975b). The initial code is the dominant site-vegetation type code and the second code (where added) reflects some local influence of secondary key stone species. These site-vegetation types were developed in consultation with Dr David Goodall (formerly CSIRO at the time). In the 1970's Dr Havel and Dr Goodall undertook extensive analyses to delineate and differentiate the key species and site parameters that assist in the division of the continuum of the dominant trees of *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri). This approach has been used for some 45 years and as such to deviate from such an approach and rely on other approaches would negate the effort to date and the ability to align the findings with other areas in the northern Jarrah forest. So whilst such an approach might be perceived by assessors to deviate from the EPA guidance statements, to not adopt the site-vegetation approach would diminish the delineation of the biodiversity values in the Residue Expansion survey area.

Table 8: Summary of Site-vegetation Types (SVT) on the Residue Expansion survey areas

SVT Code	Description	North Area Ha	% Total	South Area Ha	% Total
Swamps (AC) and Creeklines (CW)					
A	Tall shrubland of *Melaleuca lateritia, Hakea varia, Melaleuca viminea* and *Melaleuca incana* subsp. *incana* on clay-loams in seasonally wet valley floors.	37.723	2.957	2.380	0.124
A2	Low open woodland of *Melaleuca rhaphiophylla* over *Astartea scoparia* and low herbs on seasonally water-logged clays and clay loams in seasonally wet valley floors.	0.503	0.039		
AY	Open woodland of *Eucalyptus rudis* and *Eucalyptus wandoo* over *Acacia saligna, Hakea prostrata* and *Hypocalymma angustifolium* on clay- loams on valley floors.	23.986	1.880	0.142	0.007
AX	Open woodland of *Eucalyptus rudis* over *Acacia saligna, Melaleuca incana* subsp. *incana* and *Hypocalymma angustifolium* on clay-loams on valley floors.			1.570	0.082
Lower Slopes (D, Y, YG) and Moister Slopes (SW)					
D	Open forest of *Corymbia calophylla* and *Eucalyptus marginata* over *Hakea lissocarpha, Macrozamia riedlei, Acacia alata, Babingtonia camphorosmae, Hypocalymma angustifolium* and *Phyllanthus calycinus* on clay-loams on lower slopes.	31.469	2.467	8.574	0.447
L	Open woodland of *Eucalyptus patens* with some *Eucalyptus wandoo* over *Xanthorrhoea preissii, Macrozamia riedlei, Trymalium ledifolium, Acacia saligna* and *Hakea prostrata* on clay and clay loam soils on lower slopes.			0.894	0.047
Y	Open woodland of *Eucalyptus wandoo* over *Gompholobium marginatum, Acacia nervosa, Babingtonia camphorosmae, Hypocalymma angustifolium, Macrozamia riedlei, Phyllanthus calycinus* and *Gastrolobium calycinum* on clay and clay-loam soils on lower slopes.	68.171	5.344	5.756	0.300
YG	Open woodland of *Eucalyptus wandoo* over *Gompholobium marginatum, Acacia nervosa, Babingtonia camphorosmae, Hypocalymma angustifolium, Macrozamia riedlei, Pericalymma ellipticum, Grevillea bipinnatifida, Allocasuarina humilis, Phyllanthus calycinus* and *Gastrolobium calycinum* on clay and clay-loam soils with localized outcropping on lower slopes.	4.940	0.387		
SW	Open forest of *Eucalyptus marginata* and *Corymbia calophylla* over *Hypocalymma angustifolium, Babingtonia camphorosmae, Acacia celastrifolia, Hovea chorizemifolia, Daviesia preissii, Leucopogon capitellatus* and *Styphelia tenuiflora* on seasonally moister sandy-gravels on slopes.	18.345	1.438		
Slopes and Upper Ridges (Z, H, H2, PS, S, ST, M, MG)					
Z	Open forest of *Eucalyptus marginata* and *Corymbia calophylla* over *Macrozamia riedlei, Xanthorrhoea preissii, Hakea lissocarpha* and *Phyllanthus calycinus* on sandy-loam to sandy-loam gravel soils on slopes.	44.517	3.490	37.028	1.932
H	Open forest to woodland of *Eucalyptus marginata* and *Corymbia calophylla* over *Petrophile striata, Daviesia decurrens, Daviesia longifolia* and *Daviesia rhombifolia* on sandy loam to sandy gravels on slopes and ridges.	83.051	6.511	60.950	3.181
H2	Open forest to woodland of *Eucalyptus marginata* and *Corymbia calophylla* with occasional admixtures of *Banksia grandis* and *Persoonia longifolia* over *Acacia celastrifolia, Daviesia preissii, Leucopogon capitellatus* and *Styphelia tenuiflora* on gravel and sandy-gravel soils of slopes and less undulating hills.	5.024	0.394		
PS	Open forest of *Allocasuarina fraseriana, Eucalyptus marginata, Corymbia calophylla* and *Banksia grandis* over *Adenanthos barbiger, Leucopogon capitellatus* on gravels and sandy gravels on slopes and ridges.	8.125	0.637	45.084	2.353
SP	Open forest of *Eucalyptus marginata, Corymbia calophylla* and *Allocasuarina fraseriana* with admixtures of *Banksia grandis* over *Lasiopetalum cardiophyllum, Acacia celastrifolia, Styphelia tenuiflora, Daviesia decurrens* and *Trymalium ledifolium* on sandy-gravel to gravel soils on slopes and ridges.	0.212	0.017		

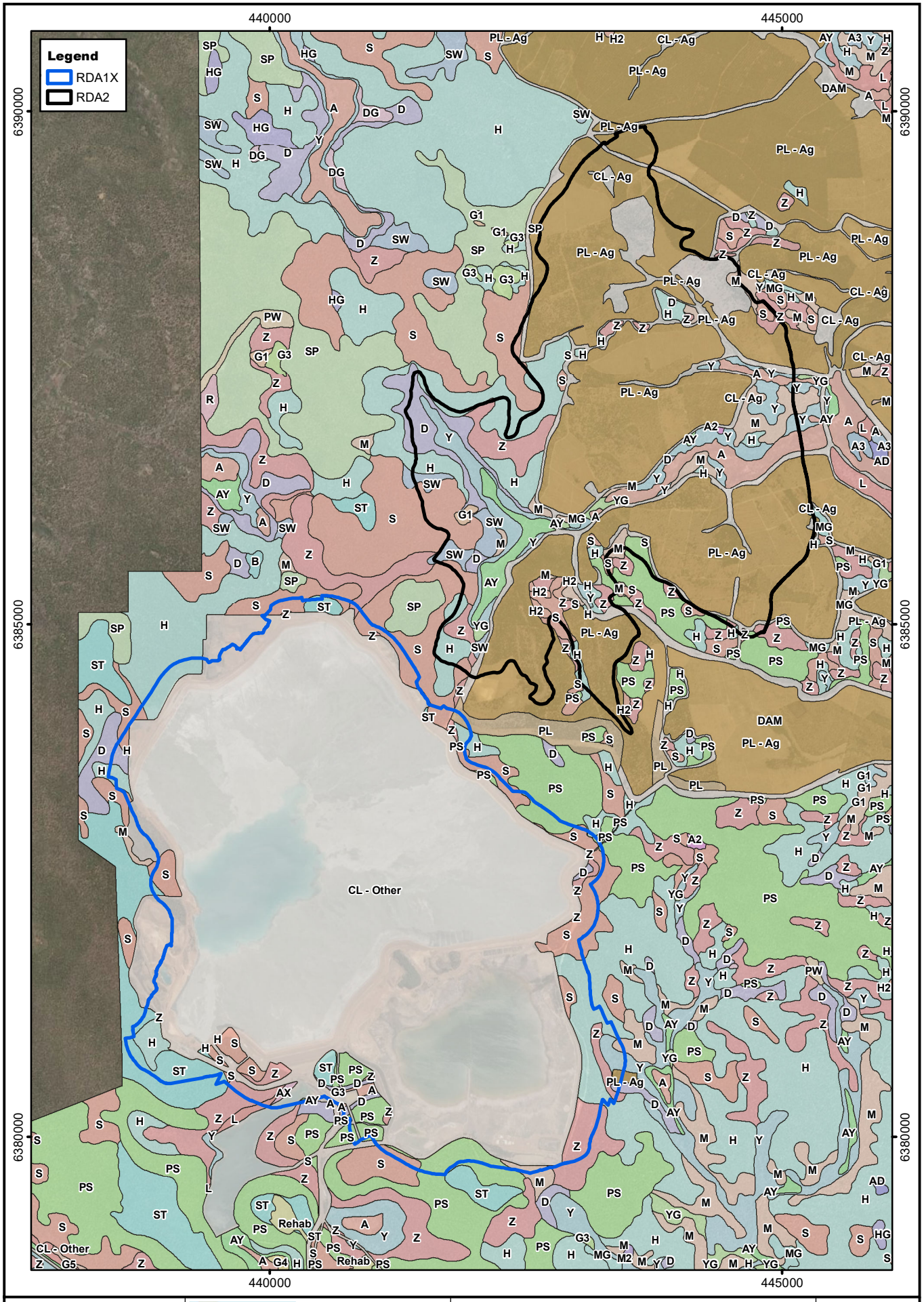
Table 8: Summary of Site-vegetation Types (SVT) on the Residue Expansion survey areas (continued)

SVT Code	Description	North Area Ha	% Total	South Area Ha	% Total
Slopes and Upper Ridges (Z, H, H2, PS, S, ST, M, MG) (continued)					
S	Open forest of *Eucalyptus marginata* and *Corymbia calophylla* with admixtures of *Allocasuarina fraseriana, Banksia grandis* and *Persoonia longifolia over Acacia celastrifolia, Hovea chorizemifolia, Daviesia preissii, Leucopogon capitellatus* and *Styphelia tenuiflora* on sandy-gravels on slopes and ridges.	46.325	3.632	81.088	4.232
ST	Open forest of *Eucalyptus marginata* and *Corymbia calophylla* with admixtures of *Allocasuarina fraseriana, Persoonia longifolia* and *Banksia grandis* over *Stylidium dichotomum, Acacia urophylla, Acacia celastrifolia, Leucopogon verticillatus, Clematis pubescens* and *Leucopogon capitellatus* on sandy-loam gravel soils on slopes and ridges.			32.488	1.696
M	Open woodland of *Eucalyptus wandoo* over *Trymalium ledifolium, Macrozamia riedlei* and *Hakea lissocarpha* on clay loams with some gravel on mid to upper slopes and ridges.	37.258	2.921	3.447	1.180
MG	Open forest of *Eucalyptus marginata* and *Corymbia calophylla* over *Macrozamia riedlei, Xanthorrhoea preissii, Hakea lissocarpha* and *Phyllanthus calycinus* on sandy-loam to sandy-loam gravel soils on slopes.	1.496	0.117		
Granite and Outcrop Areas (G types)					
G1	Mosaic of open heath of Proteaceae - Myrtaceae spp. with emergent patches of *Eucalyptus drummondii* on shallow soils on slopes.	2.486	0.195		
G3	Open heath of *Banksia squarrosa* subsp. *squarrosa, Hakea incrassata, Hakea undulata, Petrophile heterophylla* and *Petrophile serruriae* on shallow soils over granite outcrops on slopes with occasional emergent *Eucalyptus drummondii.*			0.429	0.022
Cleared Areas (CL)					
CL	Already cleared areas	141.089	11.061	1633.411	85.249
PL	Plantations			1.562	0.081
PL-Ag	Plantations – Agriculture areas	720.861	56.512	1.241	0.065

Of the site-vegetation types the L type is relatively restricted due to earlier clearing of this community for agricultural activities. The other site types of key interest due to the diversity of structural and floristic values are those associated with outcrops and shallow soils (mainly G1, G3 and to a lesser extent YG and MG). All of the latter are relatively restricted in occurrence within the two residue expansion options.

5.4. Vegetation Condition

The vegetation varied in condition from completely degraded in the pine plantation areas to either very good or excellent in the less disturbed areas, despite historical harvesting activities, fires, dieback and some established tracks, Figure 13.



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CAD Ref: g1881_F041_09

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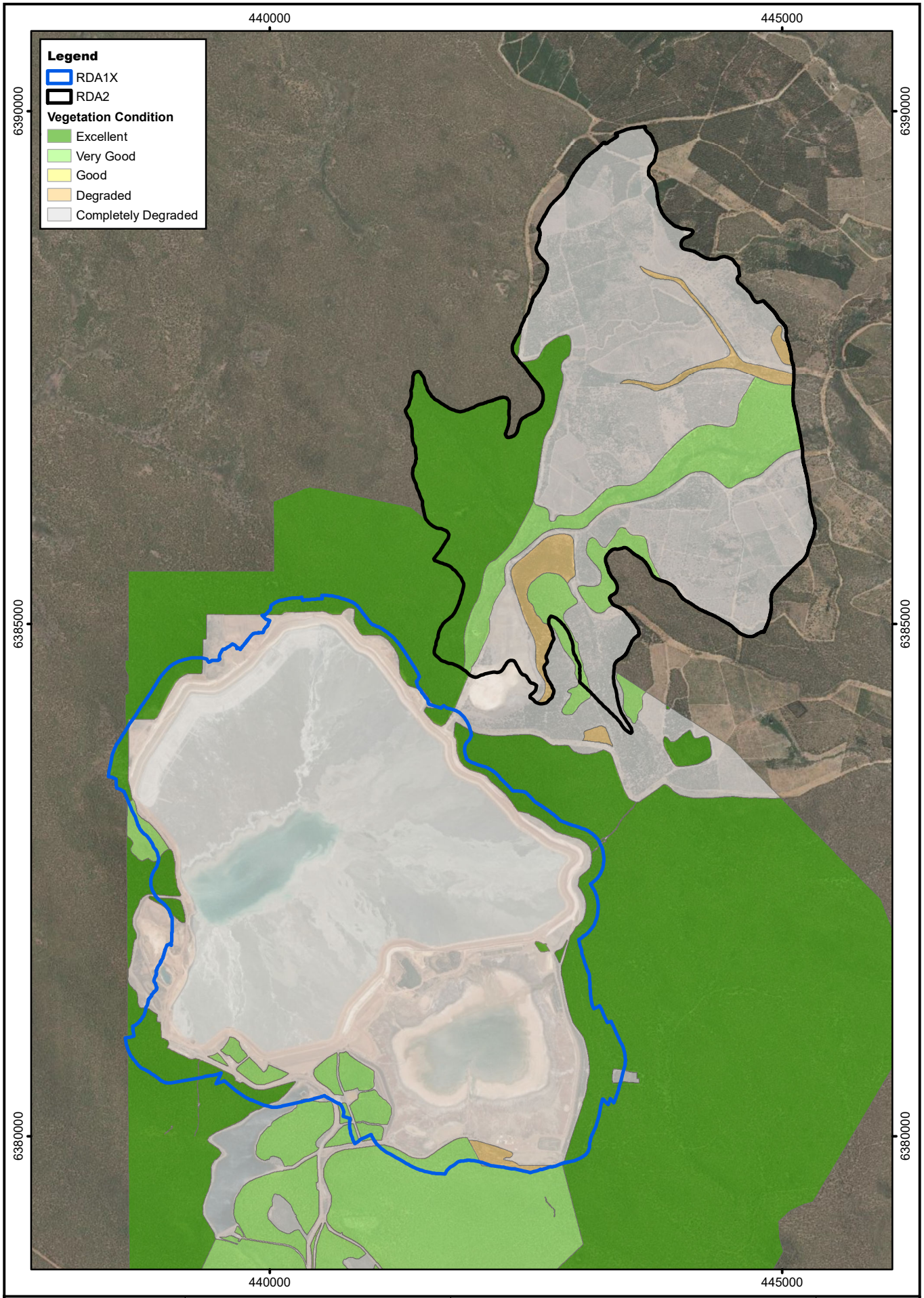
Mattiske Consulting Pty Ltd
28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640

Author: E M Matttiske | MCPL Ref:

Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

RDA1X & RDA2 Survey Areas
Site Vegetation Types

Figure:
12



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Mattiske Consulting Pty Ltd

28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640

Author: E M Matttiske | MCPL Ref:

Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

RDA1X & RDA2 Survey Areas
Vegetation Condition

Figure:

13

6. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

Mattiske Consulting Pty Ltd was commissioned by Newmont Boddington Gold Mine (Newmont) to initially conduct a desktop to evaluate previous defined flora and vegetation values on the Residue Expansion areas approximately 100 km south east of Perth, WA. The survey areas have been assessed by Mattiske Consulting Pty Ltd at a regional mapping scale as part of the System 6 studies (Heddle et al. 1980) and later for the Regional Forest Agreement (RFA) project by Mattiske and Havel (1998) and on several occasions for both Newmont and South 32 (Mattiske 19885 to 2023).

Various databases were used to identify the possible occurrence of flora (including introduced, threatened and priority taxa) and threatened and priority ecological communities within the Residue Expansion survey areas.

The Residue Expansion survey areas occur within the Northern Jarrah Forest subregion of the Southwest Botanical Province. The geology of the region comprises lateritic duricrust, with drainage lines and occasional granite hills. The Northern Jarrah Forest subregion is characterised by Jarrah (*Eucalyptus marginata*) forest on ironstone gravels and Marri-Wandoo (*Corymbia calophylla* - *Eucalyptus wandoo*) woodlands on loamy soils, with sclerophyll understoreys.

Recorded Flora Values

A total of 520 vascular plant taxa, representative of 217 genera and 73 families, have the potential to occur within the Residue Survey Areas. The most commonly represented families were Fabaceae (74 taxa), Proteaceae (40 taxa) and Myrtaceae (37 taxa). The most commonly represented genera in the survey areas were *Acacia* (25 taxa), *Hibbertia* (14 taxa) and *Lomandra* (11 taxa).

A total of 272 vascular plant taxa, representative of 143 genera and 56 families, have been recorded in the survey areas between 2012 and 2023 within the Residue Survey Areas.

No threatened flora within current listings by the Department of Biodiversity, Conservation and Attractions (DBCA 2023a, WAH 1998-) and by the Department of Climate Change, Energy and the Environment and Water [DCCEEW] (2024a) under the EPBC Act 1999 were recorded in either of the residue areas.

A range of priority flora as listed by (DBCA 2023a and WAH 1998-) have been recorded within the wider Sotico and Boddington Gold Mine areas surrounding the two residue areas. Two priority flora species occur within the Residue areas, namely:

- *Lasiopetalum cardiophyllum* (P4) – this species is relatively locally common within the Jarrah-Marri-Sheoak (Eucalyptus marginata – Corymbia calophylla – Allocasuarina fraseriana) communities near Boddington and as such is relatively restricted geographically. In view of the degree of clearing in the residue areas this species is relatively restricted to the fringes of the southern residue area.
- *Senecio leucoglossus* (P4) – this species is widespread in the northern Jarrah but occurs as scattered individuals. This species was recorded on the western fringes of the southern residue survey area.

Recorded Vegetation Values

Heddle *et al*. (1980) defined and described the dominant pre-European vegetation of the Darling System in a series of vegetation complexes as part of the System 6 studies. Mattiske and Havel (1998) updated this initial more restricted mapping coverage to the wider south-west forest region as (Regional Forest Agreement vegetation complexes). Havel, J.J. (2000) summarized in greater detail the relationships between the landforms, soils and climatic conditions. Mattiske and Havel (1998) defined and described five vegetation complexes in the survey areas. None of these are restricted to the Residue Expansion survey areas; although the Coolakin valley systems are relatively restricted in protected areas due to its occurrence in largely agricultural areas.

The Residue Expansion survey areas occur within the Regional Forest Agreement (RFA) area of the southwest forests and as such was considered during the RFA process.

No Threatened Ecological Communities (TECs) occur in the Residue Expansion survey areas (DBCA 2024a, DCCEEW 2024a).

There is potential that the granite areas (G1 and G3) as recorded in small areas in the Residue Expansion survey areas may have values that overlap with the PEC defined for similar communities south of Boddington (DBCA PEC Mount Saddleback Heath Communities PEC (P1), DBCA 2023b). The Priority 1 PEC - Mt Saddleback Heath Communities, as delineated by DBCA, occurs in the Saddleback area near Boddington. This PEC community on Mt Saddleback has affinities with selected components of the site-vegetation type G as defined by Havel (1975b) and as refined and split into site-vegetation types G1, G2, G3, G4 and G5 by Mattiske in the northern Jarrah Forest areas and more specifically G1, G3 and G4 in the South 32 areas (Mattiske Consulting Pty Ltd 2021).

A total of 20 site-vegetation types, plus 1 cleared, 1 plantation (pine trees) and 1 plantation (agricultural areas) were defined and mapped in the Residue Expansion survey areas. Of the site-vegetation types the L type is relatively restricted due to earlier clearing of this community for agricultural activities. The other site types of key interest due to the diversity of structural and floristic values are those associated with outcrops and shallow soils (mainly G1, G3 and to a lesser extent YG and MG. All of the latter are relatively restricted in occurrence within the two residue expansion options.

The vegetation varied in condition from completely degraded in the pine plantation areas to either very good or excellent in the less disturbed areas, despite historical harvesting activities, fires, dieback and some established tracks.

Groundwater Dependent Ecosystems

The potential groundwater dependent ecosystems were determined on the basis of the site-vegetation types. In view of the extensive flora and vegetation studies in the northern Jarrah Forest these vegetation complexes support species and site-vegetation types that prefer and occur on seasonally moister and wetter soils on the Swamp, Pindalup and Coolakin valley systems. This approach was considered to represent a precautionary approach in the absence of detailed groundwater level data at the time of selecting the potential groundwater dependent ecosystems at this juncture.

Old Growth Forest Areas

There are no patches of old growth forests occurring in the Residue Expansion survey areas as supplied by the Department of Biodiversity, Conservation and Attractions. The key determinants of Old Growth forests include the degree of disturbance from clearing activities, tracks, grid lines, dieback and logging as well the structural components of the forest areas. As such some of the areas within the residue areas are open woodlands, shrublands or heath and such are not defined as forests. The composition of the forests with consideration of the extent of older trees, stump numbers (if present), the composition of the

stand (in terms of regrowth and balance between senescence, older trees, mature trees and saplings) all influence the decision on whether the forest constitutes Old Growth.

The northern area is dominated by highly modified areas associated with a pine plantation operation by Mt Saddleback Tree Farrm (formerly Sotico and Bunning operations) and the southern area abuts the current residue dam and has been disturbed by tracks and previous logging operations.

7. ACKNOWLEDGEMENTS

The authors would like to thank Newmont and South32 environmental teams for their assistance over the last few decades.

8. PERSONNEL

The following Mattiske Consulting Pty Ltd personnel were recently involved in this project; however the effort of many employees of E.M. Mattiske And Associates and Mattiske Consulting Pty Ltd over the period from 1980 to 2024 is also acknowledged.

NAME	POSITION	PROJECT INVOLVEMENT	FLORA COLLECTION PERMITS
Dr EM Mattiske	Managing Director & Principal Ecologist	Project Management, Planning, Data Collation, Data interpretation, Reporting	FB62000019 -2 TFL 26-1920
L Rowles	Senior Botanist	Project Leader, Field Studies, Data Collation	FB62000020-5
A. Pereira	Experienced Botanist	Field Studies, Data Collation	FB62000145-5
D. Rubick	Experienced Botanist	Field Studies, Data Collation	FB62000328-3
A. Rowe	Botanist	Field Studies	FB62000329-3
J. Wescombe	Botanist	Data collation, reporting	N/A
R. Jones	Botanist	Data collation and Assisting with Reporting	N/A

9. REFERENCES

Beard, J.S. 1979, The vegetation of the Pinjarra Area, Western Australia. Map and Explanatory Memoir,1:250,000 Series. Vegmap Publications, Perth.

Beard, JS 1990, *Plant life of Western Australia*, Kangaroo Press, Kenthurst, NSW.

Biodiversity Conservation Act 2016 WA.

Biosecurity and Agriculture Management Act 2007 WA.

Biosecurity and Agriculture Management Regulations 2013 WA.

Bureau of Meteorology 2024, *Climate data online,* Commonwealth of Australia. Available from: http://www.bom.gov.au/climate/data/.

Churchward, H.M and McArthur, W.M. 1980, Landforms and Soils of the Darling System, Western Australia. In: Department of Conservation and Environment 1980 Atlas of Natural Resources Darling System, Western Australia. Published by the Department of Conservation and Environment, Perth, 1980.

Commonwealth of Australia 2013, *Survey Guidelines for Australia's Threatened Orchids. Guidelines for detecting Orchids listed as "Threatened" under the Environment Protection and Biodiversity Conservation Act 1999*. https://www.environment.gov.au/system/files/resources/e160f3e7-7142-4485-9211-2d1eb5e1cf31/files/draft-guidelines-threatened-orchids.pdf

Conservation Commission of Western Australia (2005) Assessment criteria and process for the Conservation Commission review of old-growth amendments. Consultation Paper, 2005.

Dell, B. & Havel, J.J. 1989, *The Jarrah Forest, an Introduction*, Chapter 1. In B. Dell et al. eds., *The Jarrah Forest*, pp. 1-10. Kluwer Academic Publishers, Dordrecht – Netherlands.

Department of Biodiversity, Conservation and Attractions 2007-, *NatureMap - mapping Western Australia's biodiversity*. Available from: http://naturemap.dec.wa.gov.au.

Department of Biodiversity, Conservation and Attractions 2023a, *Wildlife conservation rare flora notice 2022*, 25 October 2023, Minister for the Environment under section 2 of the BC Act. Available from: https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants.

Department of Biodiversity, Conservation and Attractions 2023b, Western Australian Priority Ecological Communities 19 June 2023, //www/dpaw/wa/gov.au/images/images/documents/plants-animals/threatened-species/Priority%20Ecological%20Communities%20list.pdf.

Department of Biodiversity, Conservation and Attractions 2024a, Western Australian Threatened Ecological Communities 18 March 2024. https://www/dpaw/wa/gov.au/images/plants-animals/threatened-species/threatened_ecological_communities.

Department of Climate Change, Energy, the Environment and Water 2023, *Australia's bioregions IBRA.* Available from: https://www.dcceew.gov.au/environment/land/nrs/science/ibra/australias-bioregions-maps.

Department of Climate Change, Energy, the Environment and Water 2024a, *Protected Matters Search Tool*. Available from: https://www.dcceew.gov.au/environment/epbc/protected-matters-search-tool.

Department of Climate Change, Energy, the Environment and Water 2024b, *Weeds of National Significance*. Available from: www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html.

Department of Conservation and Environment 1980, Atlas of Natural Resources Darling System, Western Australia. Published by the Department of Conservation and Environment, Perth, 1980.

Department of Parks and Wildlife 2023, *Ecological impact and invasiveness ratings from the Department of Parks and Wildlife South West Region Species Prioritisation Process,* Government of Western Australia. Available from: https://www.dpaw.wa.gov.au/plants-and-animals/plants/weeds/156-how-do-we-manage-weeds.

Department of Primary Industries and Regional Development 2024, *Western Australian Organism List*. Available from: https://www.agric.wa.gov.au/organisms.

Environment Protection and Biodiversity Conservation Act 1999 Cth

Environmental Protection Act 1986 WA

Environmental Protection Clearing of Native Vegetation Regulations 2004

Environmental Protection Environmentally Sensitive Areas Notice 2005

Environmental Protection Authority 2016a, *Environmental Factor Guideline: Flora and Vegetation*, Environmental Protection Authority, Western Australia.

Environmental Protection Authority 2016b, *Technical Guidance – Flora and vegetation surveys for environmental impact assessment*, Environmental Protection Authority, Western Australia.

Havel, J.J. 1975a, Site-vegetation mapping in the northern jarrah forest Darling Range. I. Definition of site-vegetation types. Bull. For. Dep. W. Aust. 87.

Havel, J.J. 1975b, Site-vegetation mapping in the northern jarrah forest Darling Range. II. Location and mapping of site-vegetation types. Bull. For. Dep. W. Aust. 87.

Havel, J.J. 2000, Ecology of the Forests of South Western Australia in relation to Climate and Landforms. PhD, Thesis, Murdoch University, Western Australia.

Heddle, E.M., Havel, J.J., and Loneragan, O.W., 1980, Vegetation Complexes of the Darling System, Western Australia. In: Department of Conservation and Environment 1980 Atlas of Natural Resources Darling System, Western Australia. Department of Conservation and Environment, Perth, 1980.

Mattiske, E.M. and Associates 1985. Flora and Vegetation. Boddington Gold Mine. Unpublished report prepared for Worsley Alumina Joint Venture.

Mattiske, E. M. & Associates 1990. *Flora and Vegetation. Marradong Timber Reserve.* Unpublished report prepared for Worsley Alumina Pty Ltd, February 1990.

Mattiske, E. M. & Associates 1992. *Flora and Vegetation, Eastern Anomaly Area. U*npublished report prepared for Worsley Alumina Pty Ltd, July 1992.

Mattiske, E.M. and Associates 1993a. Flora and Vegetation Assessment of the Quindanning Timber Reserve. Unpublished report prepared for Worsley Alumina Pty Ltd, 1993.

Mattiske, E.M. and Associates 1993b. Assessment of Tunnell Road Heath Communities, Boddington Bauxite Mine. Unpublished report prepared for Worsley Alumina Pty Ltd.

Mattiske, E. M. & Associates 1993c. *Flora and Vegetation Studies on the Mount Saddleback Survey Area.* Unpublished report prepared for Worsley Alumina Pty Ltd, July 1993.

Mattiske, E.M. and Associates 1993d. Flora and vegetation studies on the southern Mount Saddleback survey area. Unpublished report prepared for Worsley Alumina Pty Ltd, 1993.

Mattiske, E.M. and Associates 1994. Flora and Vegetation Study, Fawcett Property. Unpublished report prepared for Worsley Alumina Pty Ltd, 1994.

Mattiske Consulting Pty Ltd and Ninox Wildlife Consulting 1996. Flora, Vegetation and Vertebrate Fauna. Proposed Extension to Boddington Gold Mine. Prepared for Welker Environmental Consultancy.

Mattiske Consulting Pty Ltd 1996. Eighth Progress Report. Botanical Monitoring Plots, Hedges Mining Area. Prepared for Hedges Gold Pty Ltd.

Mattiske, E.M. and Havel, J.J. 1998, Vegetation Complexes of the South-west Forest Region of Western Australia. Maps prepared as part of the Regional Forest Agreement, Western Australia for the Department of Conservation and Land Management and Environment Australia.

Mattiske Consulting Pty Ltd 1999a. Assessment of Tunnell Road Heath Communities, Boddington Bauxite Mine. Unpublished report prepared for Worsley Alumina Pty Ltd.

Mattiske Consulting Pty Ltd 1999b. Flora and Vegetation component in Worsley Alumina Boddington Gold Mine Project Flora and Fauna Studies. Unpublished report prepared for Worsley Alumina Pty Ltd.

Mattiske Consulting Pty Ltd 1999c. Flora and Vegetation of the Boddington Gold Mine. Unpublished report prepared for the Boddington Gold Mine.

Mattiske Consulting Pty Ltd 1999d. Assessment of Vegetation Monitoring Plots in Quindanning Timber Reserve. Unpublished report prepared for Worsley Alumina Pty Ltd, July 1999.

Mattiske Consulting Pty Ltd 1999e. Flora and Vegetation Studies. Quindanning Survey Area. Unpublished report prepared for Worsley Alumina Pty Ltd, 1999.

Mattiske Consulting Pty Ltd 2002a. Flora and Vegetation Survey Remnant Vegetation Devereux, Nichols and Veitch Properties - Boddington Bauxite Mine, unpublished report prepared for Worsley Alumina Pty Ltd, May 2002.

Mattiske Consulting Pty Ltd 2002b. Flora and Vegetation Survey of the Boddington Gold Mine. Unpublished report prepared for Boddington Gold Mine, 2002.

Mattiske Consulting Pty Ltd 2003. *Review of declared rare and priority flora species located in the Worsley Alumina Boddington Bauxite Mine lease areas.* Unpublished report prepared for Worsley Alumina Pty Ltd, October, 2003.

Mattiske Consulting Pty Ltd 2004a. R*are and Priority Flora Assessment of Hotham Valley Railway.* Unpublished Report prepared for the Hotham Railway Friend Group.

Mattiske Consulting Pty Ltd 2004b. *Assessment of Tunnell Road Heath Communities – Boddington Bauxite Mine.* Unpublished report prepared for Worsley Alumina Pty Ltd, June 2004.

Mattiske Consulting Pty Ltd 2005. *Review of Flora and Vegetation located in the Boddington Gold Mine and Hedges Lease Areas.* Unpublished report prepared for Boddington Gold Mine, 2005.

Mattiske Consulting Pty Ltd 2008a. *Flora and Vegetation on Marradong Forest Block Boddington.* Unpublished report prepared for BHP Billiton Worsley Alumina Pty Ltd, 2008.

Mattiske Consulting Pty Ltd 2008b. *Flora and Vegetation Survey of Nichols, Black, Gibbs, Karafils, Nichols and Veitch properties, Boddington.* Unpublished report prepared for BHP Billiton Worsley Alumina Pty Ltd, 2010.

Mattiske Consulting Pty Ltd 2010a. *Flora and Vegetation of Littleton's Cut Area.* Unpublished report prepared for BHP Billiton Worsley Alumina Pty Ltd, October 2010.

Mattiske Consulting Pty Ltd 2010b. *Flora and Vegetation Survey of the Dobrowolski, Farmer, Hulls 1,ulls 2, Nullaga, Pringles, Robins, Nichols, Salmeri and Spencer Private Property Survey Area.* Unpublished report prepared for BHP Billiton Worsley Alumina Pty Ltd, September 2010.

Mattiske Consulting Pty Ltd 2010c. *Review of Flora and Vegetation on Hotham Farm and Thirty-Mile Brook.* Unpublished report prepared for Newmont Boddington Gold Mine, 2010.

Mattiske Consulting Pty Ltd 2010d. *Assessment of Flora and Vegetation Values on RDA Expansion Area at Newmont Boddington Gold Mine.* Unpublished report prepared Newmont Boddington Gold Mine, 2010.

Mattiske Consulting Pty Ltd 2012a. *Flora and Vegetation Survey of Nullaga Property Adjacent to Marradong Section of Boddington Bauxite Mine.* Unpublished report prepared for BHP Billiton Worsley Alumina Pty Ltd, December 2012.

Mattiske Consulting Pty Ltd 2012b. Threatened and Priority Flora Assessment of the Hotham Pipeline and Hedges *Dam*, unpublished report prepared for Newmont Boddington Gold Mine, August 2012.

Mattiske Consulting Pty Ltd 2012c. *Vegetation Monitoring Plots Sotico Property.* Unpublished report prepared for Newmont Boddington Gold, 2012.

Mattiske Consulting Pty Ltd 2013a. *Vegetation Monitoring Plots Sotico Property.* Unpublished report prepared for Newmont Boddington Gold, December 2013.

Mattiske Consulting Pty Ltd 2013b. *Flora and Vegetation Survey of Hotham Farm Survey Area.* Unpublished report prepared for BHP Billiton Worsley Alumina Pty Ltd, January 2013.

Mattiske Consulting Pty Ltd 2013c. *Assessment of Flora and Vegetation Values on the Proposed WRL, the Potential Land Swap Area and the Southern Section of Hotham Farm.* Unpublished report prepared for Newmont Boddington Gold Mine, December 2013.

Mattiske Consulting Pty Ltd 2014. *Assessment of Flora and Vegetation of Private Properties within the Extension Survey Areas,* unpublished report prepared for BHP Billiton Worsley Alumina Pty Ltd, December 2014.

Mattiske Consulting Pty Ltd 2017. *Assessment of Flora and Vegetation of Private Properties within the Extension Survey Areas.* Unpublished report prepared for South32 Worsley Alumina, 2017.

Mattiske Consulting Pty Ltd 2018. *Assessment of Flora and Vegetation within Expansion Extension Areas.* Unpublished report prepared for South32 Worsley Alumina, 2018.

Mattiske Consulting Pty Ltd 2020a. *Assessment of Flora and Vegetation on the Tunnell Road Heath and other Heath Areas.* In preparation for South32 Worsley Alumina, 2020.

Mattiske Consulting Pty Ltd 2020b. *Assessment of Flora and Vegetation on the Quindanning Timber Reserve.* In preparation for South32 Worsley Alumina, 2020.

Myers, N., Mittermeier R. A., Mittermeier, C. G., da Fonseca, G. A. B. and Kent, J. 2000. *Biodiversity hotspots for conservation priorities*. Nature 403, 853 – 858.

Thackway, R. & Cresswell, I.D. 1995, *An interim biogeographical regionalisation for Australia: a framework for setting priorities in the National Reserves System Cooperative Program*, version 4.0, Australian Nature Conservation Agency, Canberra.

Western Australian Herbarium 1998-, *FloraBase - the Western Australian Flora,* Department of Parks and Wildlife. Available from: https://florabase.dpaw.wa.gov.au. May 2023.

Williams, K. and Mitchell, D. 2001, 'Jarrah Forest 1 JF1 – Northern Jarrah Forest subregion' in A biodiversity audit of Western Australia's 53 biogeographical subregions in 2002, eds. JE May and NL McKenzie, Department of Conservation and Land Management, Western Australia, pp. 369 – 381.

APPENDIX A1: THREATENED AND PRIORITY FLORA DEFINITIONS

Under section 179 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), **threatened flora** are categorised as extinct, extinct in the wild, critically endangered, endangered, vulnerable and conservation dependent (Table A1.1).

Table A1.1 Federal definition of threatened flora species

Note: Adapted from section 179 of the EPBC Act.

CODE	CATEGORY	DEFINITION
Ex	**Extinct**	Species which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	**Extinct in the Wild**	Species which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	**Critically Endangered**	Species which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	**Endangered**	Species which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	**Vulnerable**	Species which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent**	Species which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

The *Biodiversity Conservation Act 2016* (BC Act) provides for (amongst other things) the protection of flora that is facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future in Western Australia under Part 10 (Division 2).

Threatened flora are listed in the *Wildlife Conservation (Rare Flora) Notice 2018* (under Part 2, Division 1, Subdivision 2 of the BC Act; Department of Biodiversity, Conservation and Attractions (DBCA 2022a) and are categorised under Schedules 1-3**.** A flora species is defined as **threatened** if it is facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future, pursuant to sections 20, 21 and 22 of the BC Act. Threatened species are categorised as critically endangered, endangered, and vulnerable (Table A1.2).

Table A1.2 State definition of threatened flora species

Note: Adapted from DBCA (2022a).

CODE	CATEGORY	DEFINITION
CR	**Critically endangered**	Species considered to be facing an extremely high risk of becoming extinct in the wild (listed under Schedule 1 of the *Wildlife Conservation (Rare Flora) Notice 2018*).
EN	**Endangered**	Species considered to be facing a very high risk of becoming extinct in the wild (listed under Schedule 2 of the *Wildlife Conservation (Rare Flora) Notice 2018*).
VU	**Vulnerable**	Species considered to be facing a high risk of becoming extinct in the wild (listed under Schedule 3 of the *Wildlife Conservation (Rare Flora) Notice 2018*).

Priority flora species are defined as "possibly threatened species that do not meet the survey criteria, or are otherwise data deficient" or species that are "adequately known, are rare but not threatened, meet criteria for near threatened or have recently been removed from the threatened species list" for other than taxonomic reasons" (DBCA 2022a). Priority species are not afforded the same level of protection under state or federal legislation as the listed Threatened species, however are considered significant under the Environmental Protection Authority's *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a). The Department of Biodiversity, Conservation and Attractions categorises priority flora into four categories: Priority 1; Priority 2, Priority 3 and Priority 4 (Table A1.3).

Table A1.3: State definition of priority flora species

Note: Adapted from DBCA (2022a).

CODE	CATEGORY	DEFINITION
P1	**Priority 1:** Poorly-known species	Known from one or a few locations (< 5) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation; or are otherwise under threat of habitat destruction or degradation. In urgent need of further survey.
P2	**Priority 2:** Poorly-known species	Known from one or a few locations (< 5). Some occurrences are on lands managed primarily for nature conservation. In urgent need of further survey.
P3	**Priority 3:** Poorly-known species	Known from several locations and the species does not appear to be under imminent threat; or from few but widespread locations with either a large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. In need of further survey.
P4	**Priority 4:** Rare, Near Threatened, and other species in need of monitoring	**a) Rare -** Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. **b) Near Threatened -** Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. **c) Other -** Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

APPENDIX A2: THREATENED AND PRIORITY ECOLOGICAL COMMUNITY DEFINITIONS

Under section 181 of the EPBC Act, **threatened ecological communities** are categorised as critically endangered, endangered and vulnerable (Table A2.1).

Table A2.1 Federal definition of threatened ecological communities

Note: Adapted from section 181 and section 182 of the EPBC Act.

CATEGORY	DEFINITION
Critically Endangered	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
Vulnerable	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

Threatened ecological communities (TECs) are listed in the *List of Threatened Ecological Communities endorsed by the Western Australian Minister for Environment (28 June 2018)* (under Part 2, Division 2, Subdivision 1 of the BC Act; DBCA 2018). An ecological community is defined as **threatened** if it is facing an extremely high risk of collapse in the immediate, near or medium-term future, pursuant to sections 28, 29 and 30 of the BC Act. Threatened ecological communities are categorised as critically endangered, endangered, and vulnerable (Table A2.2).

Currently there is no Western Australian legislation covering the conservation of state listed **threatened ecological communities** (TECs), however, a non-statutory process is in place, whereby the DBCA (and former equivalent departments) have been identifying and informally listing TECs since 1994. Some of these TECs are also endorsed by the Federal Minister as threatened, and some of these are listed under the EPBC Act and therefore afforded legislative protection at the Commonwealth level.

Table A2.2 State definition of threatened ecological communities

Note: Adapted from DBCA (2018).

CODE	CATEGORY	DEFINITION
CR	**Critically Endangered**	An ecological community will be listed as CR when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting **any one or more of** the following criteria: **1.** The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification; **2.** The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or **3.** The ecological community is highly modified with potential of being rehabilitated in the immediate future.
EN	**Endangered**	An ecological community will be listed as EN when it has been adequately surveyed and is not CR, but is facing a very high risk of total destruction in the near future. The ecological community must meet **any one or more of** the following criteria: **1.** The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short term future, or is unlikely to be substantially rehabilitated in the short term future due to modification; **2.** The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or **3.** The ecological community is highly modified with potential of being rehabilitated in the short term future.
VU	**Vulnerable**	An ecological community will be listed as VU when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet **any one or more of** the following criteria: **1.** The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated; **2.** The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution; or **3.** The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.

Priority ecological communities (PECs) are defined as possible threatened ecological communities that do not meet the stringent survey criteria for the assessment of threatened ecological communities, and are listed by the DBCA (2022b) in the *Priority Ecological Communities for Western Australia – Version 34 (21 December 2022)*. Similarly to priority flora, PECs are not afforded legislative protection, however are considered significant under the Environmental Protection Authority's (2016a) *Environmental Factor Guideline: Flora and Vegetation*. The Department of Biodiversity, Conservation and Attractions categorises priority ecological communities into five categories: Priority 1; Priority 2, Priority 3, Priority 4 and Priority 5 (Table A2.3).

Table A2.3 State definition of priority ecological communities

Note: Adapted from DBCA (2022b).

CODE	CATEGORY	DEFINITION
P1	**Priority 1** (Poorly known ecological communities)	Ecological communities that are known from very few, restricted occurrences (generally ≤ 5 occurrences or a total area of ≤ 100 ha). Most of these occurrences are not actively managed for conservation (e.g. located within agricultural or pastoral lands, urban areas, or active mineral leases) and for which immediate threats exist.
P2	**Priority 2** (Poorly known ecological communities)	Communities that are known from few small occurrences (generally ≤ 10 occurrences or a total area of ≤ 200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation.
P3	**Priority 3** (Poorly known ecological communities)	**1.** Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation; **2.** Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat; or **3.** Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.
P4	**Priority 4** (Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring)	**1.** Rare – Communities known from few occurrences that are considered to have been adequately surveyed, sufficient knowledge is available, and are considered not to be currently threatened. **2.** Near Threatened – Communities considered to have been adequately surveyed and do not qualify for Conservation Dependent, but are close to qualifying for Vulnerable. **3.** Communities that have been removed from the list of threatened communities during the past five years.
P5	**Priority 5** (Conservation Dependent ecological communities)	Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

APPENDIX A3: CATEGORIES AND CONTROL MEASURES OF DECLARED PEST (PLANT) ORGANISMS IN WESTERN AUSTRALIA

Section 22 of Western Australia's *Biosecurity and Agriculture Management Act 2007* (BAM Act) makes provision for a plant taxon to be listed as a declared pest organism in respect to parts of, or the entire State. According to the BAM Act, a declared pest is defined as a prohibited organism (section 12), or an organism for which a declaration under section 22 (2) of the Act is in force.

Under the *Biosecurity and Agriculture Management Regulations 2013* (WA), declared pest plants are placed in one of three control categories, C1 (exclusion), C2 (eradication) or C3 (management), which determines the measures of control which apply to the declared pest (Table A4.1). The current listing of declared pest organisms and their control category is through the Western Australian Organism List (Department of Primary Industries and Regional Development 2023).

Table A3.1 Categories and control measures of declared pest (plant) organisms

Note: Adapted from *Biosecurity and Agriculture Management Regulations 2013*.

CONTROL CATEGORY	CONTROL MEASURES
C1 (Exclusion) '(a) Category 1 (C1) — Exclusion: if in the opinion of the Minister introduction of the declared pest into an area or part of an area for which it is declared should be prevented.' Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.	In relation to a category 1 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C2 (Eradication) '(b) Category 2 (C2) — Eradication: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is feasible.' Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.	In relation to a category 2 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C3 (Management) '(c) Category 3 (C3) — Management: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is not feasible but that it is necessary to: **(i)** alleviate the harmful impact of the declared pest in the area; or **(ii)** reduce the number or distribution of the declared pest in the area; or **(iii)** prevent or contain the spread of the declared pest in the area.' Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.	In relation to a category 3 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to: **(a)** alleviate the harmful impact of the declared pest in the area for which it is declared; or **(b)** reduce the number or distribution of the declared pest in the area for which it is declared; or **(c)** prevent or contain the spread of the declared pest in the area for which it is declared.

APPENDIX A4: OTHER DEFINITIONS

Environmentally sensitive areas

Environmentally sensitive areas are declared by the State Minister under section 51B of the *Environmental Protection Act 1986* (EP Act) and are listed in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, gazetted 8 April 2005. Specific environmentally sensitive areas relevant to this report include: a defined wetland and the area within 50 metres of the wetland; the area covered by vegetation within 50 metres of rare flora; the area covered by a threatened ecological community; a Bush Forever site – further areas and information are described in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*.

Conservation significant flora

Under the *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a), flora may be considered significant for a range of reasons, including, but not limited to the following:

- being identified as threatened or priority species;
- locally endemic or associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- new species or anomalous features that indicate a potential new species;
- representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- unusual species, including restricted subspecies, varieties or naturally occurring hybrids; or
- relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Conservation significant vegetation

Under the *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a), vegetation may be considered significant for a range of reasons, including, but not limited to the following:

- being identified as threatened or priority ecological communities;
- restricted distribution;
- degree of historical impact from threatening processes;
- a role as a refuge; or
- providing an important function required to maintain ecological integrity of a significant ecosystem.

APPENDIX A5: DEFINITION OF VEGETATION CONDITION SCALE FOR THE SOUTH WEST AND INTERZONE BOTANICAL PROVINCES

Vegetation condition ratings relate to vegetation structure, level of disturbance at each structural layer and the ability of the vegetation unit to regenerate (Table A5.1). Vegetation condition provides complementary information for assessing the significance of potential impacts.

Table A5.1 Definition of vegetation condition categories

Note: Adapted from Keighery (1994).

CATEGORY	DEFINITION
1	Pristine or nearly so, no obvious sign of disturbance or damage caused by human activities since European settlement.
2	Vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
3	Vegetation structure altered obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
4	Vegetation structure significantly altered by obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
5	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
6	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

APPENDIX B: POTENTIAL AND RECORDED PLANT SPECIES IN RESIDUE EXPANSION AREAS

Note : * denotes alien species; # referring to part native and part naturalised. T, P1 to P4 reflect Threatened and Priority species (DBCA 2019).

SCC = State Conservation Code; FCC= Federal Conservation Code; CE = Critically Endangered; E = Endangered; V= Vulnerable.

EPBC[A] (DCCEEW, 2024), Dandjoo[B] (DBCA, 2023), NatureMap[C] (DBCA, 2023), MCPL[D] (MCPL, 2018), MCPL[E] (MCPL, 2018), MCPL[F] (MCPL, 1998), MCPL (MCPLL G2012), MCPLH M(CPL2013), MCPL 2023

Search includes all potential species within the noted buffer, individual species have not been assessed for likelihood of occurance in this list.

Family	Species	Data Source											
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ALLIACEAE	* *Allium triquetrum*					x						
AMARANTHACEAE	*Ptilotus drummondii*								x			
	Ptilotus gaudichaudii				x	x						
	Ptilotus manglesii					x		x	x			x
APIACEAE	*Daucus glochidiatus*					x		x	x			
	Pentapeltis peltigera					x			x		x	x
	Platysace juncea					x						
	Xanthosia atkinsoniana				x	x			x	x	x	x
	Xanthosia candida					x		x	x	x		x
	Xanthosia huegelii								x			
APOCYNACEAE	* *Gomphocarpus fruticosus*									x		
	Parsonsia diaphanophleba	P4				x	x					
ARALIACEAE	*Hydrocotyle diantha*					x						
	Hydrocotyle lemnoides	P4					x					
	Trachymene pilosa					x		x			x	x
ASPARAGACEAE	*Acanthocarpus preissii*								x			
	Laxmannia squarrosa					x					x	
	Lomandra brittanii					x			x		x	x
	Lomandra caespitosa					x			x	x	x	x
	Lomandra hermaphrodita							x	x	x	x	x
	Lomandra integra								x		x	
	Lomandra micrantha								x	x		
	Lomandra nigricans								x			
	Lomandra preissii							x	x			
	Lomandra purpurea								x			
	Lomandra sericea					x		x	x			
	Lomandra sonderi								x	x	x	x

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ASPARAGACEAE (continued)	*Lomandra spartea*							x	x	x	x	x
	Sowerbaea laxiflora					x					x	x
	Thysanotus cymosus	P3			x							
	Thysanotus dichotomus							x	x			x
	Thysanotus fastigiatus										x	
	Thysanotus manglesianus					x						
	Thysanotus multiflorus								x		x	
	Thysanotus tenellus										x	
	Thysanotus thyrsoideus								x		x	x
ASTERACEAE	* *Arctotheca calendula*							x		x		x
	Asteridea gracilis	P3					x					
	Brachyscome bellidioides										x	
	* *Cotula turbinata*										x	
	Craspedia variabilis					x			x			
	* *Erigeron sumatrensis*					x						
	Hyalosperma cotula							x	x		x	x
	* *Hypochaeris glabra*					x		x	x	x	x	x
	* *Hypochaeris radicata*							x				
	Lagenophora huegelii					x		x	x	x	x	x
	Myriocephalus occidentalis					x						
	Olearia paucidentata					x			x			
	Ozothamnus sp.					x						
	Panaetia lessonii							x				
	Podolepis gracilis							x			x	
	Pseudognaphalium luteoalbum					x		x				x
	Rhodanthe citrina										x	
	Senecio diaschides							x	x	x		x
	Senecio hispidulus								x		x	x
	Senecio leucoglossus	P4					x					
	Senecio quadridentatus								x			
	Senecio sp.					x						

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ASTERACEAE (continued)	* *Sonchus oleraceus*							x			x	x
	Trichocline spathulata					x		x		x	x	x
	* *Ursinia anthemoides*								x	x	x	x
	Waitzia acuminata								x			
	Waitzia suaveolens							x				
	Xerochrysum macranthum										x	
BORAGINACEAE	*Halgania corymbosa*	P3					x				x	
	Halgania cyanea					x						
BORYACEAE	*Borya sphaerocephala*								x		x	x
BYBLIDACEAE	*Byblis gigantea*	P3					x					
CAMPANULACEAE	*Isotoma hypocrateriformis*							x			x	
	Lobelia rhombifolia					x						
	Isotoma scapigera										x	
CARYOPHYLLACEAE	* *Petrorhagia dubia*							x				
	* *? Sagina* sp.										x	
CASUARINACEAE	*Allocasuarina fraseriana*							x			x	x
	Allocasuarina huegeliana							x	x			
	Allocasuarina humilis								x			x
	Casuarina obesa									x		
CELASTRACEAE	*Stackhousia monogyna*							x	x		x	x
	Tripterococcus brunonis								x		x	x
COLCHICACEAE	*Burchardia congesta*								x			
	Burchardia multiflora										x	
CONVOLVULACEAE	? Convolvulaceae sp.										x	

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CYPERACEAE	* *Carex divisa*										x		
	Cyathochaeta avenacea								x		x		
	Eleocharis acuta					x							
	Eleocharis keigheryi	T	V	x			x						
	Ficinia nodosa								x				
	Isolepis cernua var. *setiformis*										x		
	Isolepis cyperoides										x		
	Isolepis producta					x							
	* *Isolepis prolifera*										x		
	Lepidosperma leptostachyum					x		x	x		x		
	Lepidosperma pruinosum					x							
	Lepidosperma squamatum							x	x		x		
	Lepidosperma striatum								x				
	Lepidosperma tenue								x				
	Lepidosperma tetraquetrum										x		
	Lepidosperma tuberculatum								x				
	Lepidosperma sp.					x		x			x		x
	Machaerina juncea								x		x		
	Mesomelaena tetragona								x				
	Morelotia australiensis	T	V				x						
	Morelotia octandra							x	x	x	x		
	Netrostylis sp. Jarrah Forest (R. Davis 7391)								x	x	x		x
	Netrostylis sp. Blackwood River (A.R. Annels 3043)	P3				x							
	Schoenus natans	P4					x				x		
	Cyperaceae sp.										x		
DASYPOGONACEAE	*Kingia australis*								x				
DENNSTAEDTIACEAE	*Pteridium esculentum*					x		x	x		x		
DILLENIACEAE	*Hibbertia acerosa*								x		x		
	Hibbertia ambita	P1				x							

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DILLENIACEAE (continued)	*Hibbertia amplexicaulis*					x		x	x	x	x	x
	Hibbertia commutata				x	x		x	x	x	x	x
	Hibbertia diamesogenos					x		x	x		x	x
	Hibbertia hypericoides				x	x		x	x	x	x	
	Hibbertia montana						x					
	Hibbertia ovata					x						x
	Hibbertia perfoliata								x			
	Hibbertia pilosa							x				
	Hibbertia semipilosa				x							
	Hibbertia silvestris								x		x	
	Hibbertia spicata					x			x			
	Hibbertia stellaris				x	x						
DROSERACEAE	*Drosera erythrorhiza*					x			x			
	Drosera gigantea										x	
	Drosera macrantha					x			x			
	Drosera menziesii									x	x	
	Drosera occidentalis	P4					x					
	Drosera pallida					x						
	Drosera platystigma										x	
	Drosera scorpioides										x	
	Drosera stolonifera								x			
	Drosera sp.							x				
	Drosera sp. (climbing)										x	
ELAEOCARPACEAE	*Tetratheca hirsuta*							x	x		x	x
	Tetratheca nuda								x			x
	Tetratheca similis	P3					x					
	Tetratheca virgata					x					x	
ERICACEAE	*Andersonia latiflora*					x			x			
	Andersonia sp. Saxatilis (F. & J. Hort 3324)	T					x					

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ERICACEAE (continued)	*Leucopogon australis*								x		x	
	Leucopogon capitellatus					x		x	x	x	x	x
	Leucopogon cordatus					x						
	Leucopogon verticillatus					x			x		x	x
	Leucopogon sp.							x				
	Styphelia discolor					x			x	x	x	
	Styphelia erectifolia								x			
	Styphelia nitens					x		x	x		x	x
	Styphelia pallida							x	x		x	
	Styphelia propinqua							x	x		x	x
	Styphelia serratifolia					x						
	Styphelia tenuiflora								x	x	x	x
	Styphelia sp.							x				x
EUPHORBIACEAE	*Monotaxis occidentalis*								x			
FABACEAE	*Acacia alata*								x	x		
	Acacia alata var. *platyptera*	P4					x					
	Acacia applanata								x			
	Acacia barbinervis subsp. *barbinervis*					x						
	Acacia browniana							x	x		x	
	Acacia celastrifolia					x		x	x			
	Acacia cuneifolia	P4					x					
	Acacia divergens										x	
	Acacia drummondii subsp. *candolleana*					x			x	x	x	x
	Acacia drummondii subsp. *drummondii*					x		x	x	x	x	x
	Acacia extensa					x			x		x	
	Acacia incrassata								x			
	Acacia incurva								x			
	Acacia insolita subsp. *insolita*					x			x			
	Acacia lateriticola							x	x	x	x	x
	Acacia leptospermoides subsp. *leptospermoides*					x						

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FABACEAE (continued)	*Acacia nervosa*								x		x		
	Acacia oncinophylla subsp. *patulifolia*	P4					x						
	Acacia preissiana								x	x	x		
	Acacia pulchella							x	x	x	x	x	
	Acacia pulchella var. *glaberrima*					x			x				
	Acacia saligna					x		x	x	x	x		
	Acacia saligna subsp. Southern forest (B.R. Maslin & J.E. Reid BRM 9952)					x							
	Acacia saligna subsp. Wheatbelt (B.R. Maslin 8602)					x							
	Acacia urophylla								x				
	Bossiaea ornata					x		x	x	x	x	x	
	Bossiaea rufa												
	Chorizema rhombeum								x				
	Chorizema ulotropis	P4					x						
	Daviesia cordata					x			x				
	Daviesia decurrens								x	x	x		
	Daviesia decurrens subsp. *decurrens*					x							
	Daviesia divaricata										x		
	Daviesia hakeoides subsp. *hakeoides*								x				
	Daviesia horrida								x				
	Daviesia incrassata					x			x				
	Daviesia incrassata subsp. *incrassata*					x				x			
	Daviesia longifolia								x				
	Daviesia physodes								x				
	Daviesia preissii					x		x	x				
	Daviesia rhombifolia								x		x		
	Gastrolobium bilobum				x	x							
	Gastrolobium calycinum					x			x	x		x	
	Gastrolobium ebracteolatum										x		
	Gastrolobium hookeri				x	x							
	Gastrolobium ovalifolium	P4			x								
	Gastrolobium spinosum								x	x			
	Gastrolobium sp. Prostrate Boddington (M. Hislop 2130)	P1				x	x	x		x			
	Gastrolobium spinosum							x					

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FABACEAE (continued)	*Gompholobium capitatum*								x			
	Gompholobium cyaninum									x		
	Gompholobium knightianum								x			x
	Gompholobium marginatum							x	x	x	x	x
	Gompholobium polymorphum							x	x		x	
	Gompholobium preissii							x	x			x
	Hardenbergia comptoniana							x				
	Hovea chorizemifolia					x		x	x	x	x	x
	Hovea trisperma					x		x	x		x	
	Jacksonia furcellata				x	x			x		x	
	Jacksonia sternbergiana									x		
	Kennedia coccinea					x			x	x		x
	Kennedia prostrata							x	x		x	x
	Labichea punctata							x	x		x	
	* *Lotus subbiflorus*							x				
	Mirbelia dilatata				x	x						x
	Pultenaea pauciflora	T	V	x		x	x					
	Sphaerolobium medium								x		x	
	Templetonia drummondii										x	
	* *Trifolium angustifolium*							x				
	* *Trifolium arvense* var. *arvense*							x				
	* *Trifolium campestre* var. *campestre*							x				
	* *Trifolium dubium*										x	
	* *Trifolium* sp.							x				
	Viminaria juncea								x			
GERANIACEAE	* *Geranium molle*							x				
	Pelargonium littorale								x			
GOODENIACEAE	*Dampiera alata*							x	x		x	x
	Dampiera linearis								x		x	x
	Goodenia caerulea					x						

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GOODENIACEAE	*Goodenia convexa*					x						
(continued)	*Goodenia katabudjar*	P3					x		x			x
	Goodenia pusilla				x	x						
	Goodenia trinervis										x	
	Goodenia sp.										x	
	Lechenaultia biloba					x			x	x	x	x
	Scaevola calliptera					x		x	x		x	x
	Scaevola glandulifera					x						
HAEMODORACEAE	*Conostylis aculeata* subsp. *aculeata*								x			
	Conostylis caricina subsp. caricina					x						
	Conostylis pusilla					x				x	x	x
	Conostylis serrulata								x			
	Conostylis setigera					x		x	x		x	
	Conostylis setigera subsp. *setigera*					x			x			
	Haemodorum laxum					x		x				
	Haemodorum simplex							x			x	
	Haemodorum sp.							x	x	x		
	Tribonanthes australis								x			
HALORAGACEAE	*Glischrocaryon aureum*							x	x		x	x
	Gonocarpus cordiger								x			
	Haloragis aculeolata	P2					x					
	Meionectes tenuifolia	P3				x	x					
HEMEROCALLIDACEAE	*Agrostocrinum hirsutum*										x	
	Agrostocrinum scabrum							x				
	Caesia micrantha										x	
	Chamaescilla corymbosa					x		x	x	x	x	x
	Corynotheca micrantha									x		
	Dianella revoluta								x	x	x	
	Stypandra glauca										x	

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HEMEROCALLIDACEAE (continued)	*Tricoryne elatior*								x		x	
	Tricoryne humilis										x	
HYPOXIDACEAE	*Pauridia occidentalis*								x			
IRIDACEAE	* *Gladiolus tristis*					x						
	* *Moraea flaccida*								x		x	x
	Patersonia occidentalis					x			x	x	x	x
	Patersonia babianoides								x			x
	Patersonia pygmaea								x	x	x	
	Patersonia rudis					x			x		x	
	Patersonia umbrosa								x			
	* *Romulea rosea*									x	x	
	* Iridaceae sp.										x	
JUNCACEAE	* *Juncus acutus*										x	x
	* *Juncus acutus* subsp. *acutus*					x				x		
	* *Juncus capitatus*									x		
	Juncus pallidus								x		x	x
	Juncus planifolius									x		
JUNCAGINACEAE	*Triglochin ?striata*										x	
LAMIACEAE	*Hemiandra pungens*								x			
	Hemigenia incana									x	x	
	Hemigenia microphylla	P3					x					
	Hemigenia pritzelii						x		x			
	* *Lavandula stoechas*										x	
	* ? Lamiaceae sp.										x	
LAURACEAE	*Cassytha racemosa*								x			
	Cassytha sp.										x	

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LENTIBULARIACEAE	*Utricularia inaequalis*										x		
	Utricularia multifida										x		
LINACEAE	*Linum marginale*										x		
LOGANIACEAE	*Logania sylvicola*	P2					x						
	Orianthera serpyllifolia								x				
	Phyllangium divergens										x		
	Phyllangium paradoxum							x					
MALVACEAE	*Lasiopetalum bracteatum*	P4			x								
	Lasiopetalum cardiophyllum	P4				x	x		x				x
	Lasiopetalum caroliae	P3					x						
	Lasiopetalum floribundum				x	x		x	x		x		x
	Lasiopetalum glutinosum subsp. *latifolium*					x							
	Thomasia paniculata										x		
MENYANTHACEAE	*Ornduffia submersa*	P4					x						
MYRTACEAE	*Astartea scoparia*								x	x	x		x
	Babingtonia camphorosmae									x	x		
	PL *Callistemon phoeniceus*										x		
	Calothamnus planifolius								x				
	Calothamnus planifolius var. *planifolius*					x							
	Calothamnus quadrifidus subsp. *teretifolius*	P4					x						
	Calytrix simplex subsp. *simplex*	P1				x	x						
	Corymbia calophylla					x		x	x	x	x		x
	Darwinia horiorum	P1			x								
	Darwinia pimelioides	P4					x						
	Darwinia sp. Dryandra (G.J. Keighery 9295)	P4					x						
	Darwinia thymoides subsp. St Ronans (J.J. Alford & G.J. Keighery 64)	P4					x						
	Eucalyptus accedens							x					
	Eucalyptus aspersa				x	x							

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MYRTACEAE (continued)	*Eucalyptus drummondii*								x				
	Eucalyptus exilis	P4					x						
PL	*Eucalyptus globulus*										x		
	Eucalyptus latens					x							
	Eucalyptus marginata					x		x	x	x	x	x	
	Eucalyptus patens					x		x	x		x	x	
	Eucalyptus rudis					x		x	x	x	x		
	Eucalyptus wandoo							x	x	x	x	x	
	Hypocalymma angustifolium								x	x	x	x	
	Leptospermopsis erubescens					x		x					
	Melaleuca acuminata										x		
	Melaleuca brevifolia									x			
	Melaleuca cuticularis									x			
	Melaleuca incana								x				
	Melaleuca lanceolata										x		
	Melaleuca lateritia							x	x		x		
	Melaleuca rhaphiophylla							x		x	x		
	Melaleuca scabra								x				
	Melaleuca thyoides									x			
	Melaleuca viminea								x		x	x	
	Melaleuca viminea subsp. *viminea*									x			
	Pericalymma ellipticum								x				
	Taxandria linearifolia					x			x		x		
	Verticordia fimbrilepis subsp. *fimbrilepis*	T	E	x			x						
OLACACEAE	*Olax benthamiana*								x				
ONAGRACEAE	* ?*Oenothera* sp.									x			
ORCHIDACEAE	*Caladenia dorrienii*	T	E				x						
	Caladenia flava					x			x		x	x	
	Caladenia hopperiana	T	E				x						

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ORCHIDACEAE (continued)	*Diuris micrantha*	T	V				x					
	Caladenia integra	P4					x					
	Cryptostylis ovata								x			
	Cyrtostylis huegelii								x			
	* *Disa bracteata*							x				x
	Diuris corymbosa								x			
	Diuris longifolia								x			
	Diuris porrifolia				x	x						
	Eriochilus dilatatus								x			
	Microtis sp.										x	
	Pheladenia deformis								x			
	Pterostylis barbata								x			
	Pterostylis glebosa				x	x						
	Pterostylis recurva								x			
	Pterostylis vittata								x			
	Pyrorchis nigricans								x			
	Thelymitra crinita					x			x		x	x
	Thelymitra macrophylla										x	
	Thelymitra sp.										x	
	Orchidaceae sp.							x				
OROBANCHACEAE	* *Bellardia trixago*										x	
	* *Bellardia viscosa*										x	
	* *Orobanche minor*										x	
OXALIDACEAE	* *Oxalis corniculata*								x			
	Oxalis exilis					x						
	Oxalis sp.							x		x	x	
PHILYDRACEAE	*Philydrella pygmaea* subsp. *pygmaea*										x	
PHYLLANTHACEAE	*Lysiandra calycina*					x		x	x	x	x	x

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PITTOSPORACEAE	*Billardiera floribunda*								x			
	Billardiera fraseri								x			
	Billardiera fusiformis				x	x		x	x		x	x
	Billardiera heterophylla									x		
	Billardiera variifolia								x			
	Marianthus drummondianus								x			
	Marianthus bicolor					x						
PLANTAGINACEAE	*Plantago exilis*					x						
	* *Plantago lanceolata*								x			
POACEAE	* *Aira caryophyllea*							x			x	x
	Amphibromus nervosus							x				
	Amphipogon amphipogonoides								x			
	Amphipogon turbinatus										x	
	Amphipogon sp.					x						
	Austrostipa campylachne							x				
	Austrostipa compressa										x	
	Austrostipa elegantissima							x				
	Austrostipa mollis										x	
	Austrostipa trichophylla							x				
	Austrostipa sp.										x	
	* *Avena barbata*					x		x				x
	* *Briza maxima*							x	x		x	x
	* *Briza minor*					x		x	x		x	x
	* *Bromus diandrus*					x		x				x
	* *Bromus madritensis*							x				
	* *Ehrharta calycina*							x				
	* *Ehrharta longiflora*							x				x
	* *Hordeum hystrix*							x				
	* *Lolium perenne*							x				
	* *Lolium rigidum*							x				x

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POACEAE (continued)	*Microlaena stipoides*										x	
	Neurachne alopecuroidea							x	x	x	x	x
	Poa homomalla					x						
	Poa porphyroclados					x						
	* *Polypogon monspeliensis*							x				
	Rytidosperma caespitosum							x				x
	Rytidosperma setaceum					x						
	Rytidosperma sp.								x			
	Tetrarrhena laevis					x		x	x	x	x	x
	* *Vulpia myuros*							x				x
	Poaceae sp.							x		x	x	
PODOCARPACEAE	*Podocarpus drouynianus*								x			
POLYGALACEAE	*Comesperma calymega*										x	x
	Comesperma virgatum								x		x	
POLYGONACEAE	* *Rumex obtusifolius* subsp. *obtusifolius*					x						
PRIMULACEAE	* *Lysimachia arvensis*					x		x				x
	Samolus junceus										x	
PROTEACEAE	*Adenanthos barbiger*							x				
	Banksia bipinnatifida								x			x
	Banksia bipinnatifida subsp. *bipinnatifida*									x		
	Banksia dallanneyi subsp. *dallanneyi* var. *dallanneyi*					x		x	x	x	x	x
	Banksia grandis				x	x		x	x	x	x	x
	Banksia insulanemorecincta	P4					x					
	Banksia littoralis				x	x			x		x	
	Banksia recurvistylis	P2					x					
	Banksia sessilis							x	x		x	x
	Banksia sessilis var. *sessilis*					x						

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PROTEACEAE (continued)	*Banksia squarrosa* subsp. *squarrosa*								x		x	
	Banksia subpinnatifida var. *imberbis*	P3					x					
	Conospermum filifolium subsp. *filifolium*					x						
	Grevillea bipinnatifida								x		x	x
	Grevillea bipinnatifida subsp. *bipinnatifida*									x		
	Grevillea crowleyae	P2					x					
	Grevillea dissectifolia	P3					x					
	Grevillea monticola					x				x		
	Grevillea quercifolia								x			
	Hakea amplexicaulis								x			
	Hakea cyclocarpa								x			
	Hakea incrassata								x	x		
	Hakea lissocarpha					x		x	x	x	x	x
	Hakea oldfieldii	P3					x					
	Hakea preissii								x			
	Hakea prostrata					x		x	x	x	x	x
	Hakea ruscifolia								x			
	Hakea trifurcata								x			
	Hakea undulata								x			x
	Hakea varia								x	x	x	
	Isopogon spathulatus subsp. *spathulatus*						x					
	Persoonia elliptica								x	x		
	Persoonia longifolia					x		x	x	x	x	
	Petrophile heterophylla					x			x			
	Petrophile serruriae					x			x			
	Petrophile striata								x	x	x	
	Synaphea gracillima				x	x			x			
	Synaphea panhesya	P1					x					
	Synaphea petiolaris								x			
	Xylomelum occidentale								x			

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PTERIDACEAE	*Cheilanthes austrotenuifolia*								x			
	Cheilanthes sieberi							x				
RANUNCULACEAE	*Clematis pubescens*					x		x	x		x	x
	Ranunculus colonorum					x		x	x			
	* *Ranunculus muricatus*					x						
RESTIONACEAE	*Desmocladus asper*									x		
	Desmocladus fasciculatus							x	x			x
	Desmocladus flexuosus							x		x	x	x
	Lepidobolus chaetocephalus										x	
	Leptocarpus coangustatus								x			
	Leptocarpus laxus								x			
	Leptocarpus tenax								x			
	Loxocarya cinerea								x			x
RHAMNACEAE	*Cryptandra arbutiflora* var. *arbutiflora*					x				x		
	Cryptandra nutans					x						
	Papistylus intropubens	P1					x					
	Stenanthemum tridentatum								x			
	Trymalium ledifolium							x	x		x	x
	Trymalium ledifolium var. *rosmarinifolium*					x						
	Trymalium odoratissimum								x		x	x
	Trymalium odoratissimum subsp. *odoratissimum*							x				
	Trymalium odoratissimum subsp. *trifidum*					x						
ROSACEAE	*Acaena echinata*							x	x	x		
RUBIACEAE	* *Galium divaricatum*					x						
	Opercularia echinocephala					x		x	x	x		x
	Opercularia hispidula				x	x						

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RUBIACEAE (continued)	*Opercularia apiciflora*								x	x		
	Opercularia sp.										x	
RUTACEAE	*Boronia crenulata*								x			
	Boronia fastigiata					x			x	x	x	x
	Cyanothamnus tenuis	P4					x					
	Philotheca spicata								x		x	
SANTALACEAE	*Leptomeria cunninghamii*					x	x					
SAPINDACEAE	*Dodonaea viscosa* subsp. *angustissima*									x		
SOLANACEAE	*Anthocercis gracilis*	T	V				x					
STYLIDIACEAE	*Levenhookia pusilla*							x			x	x
	Stylidium affine							x				x
	Stylidium amoenum					x		x	x	x	x	x
	Stylidium calcaratum										x	
	Stylidium carnosum										x	
	Stylidium ciliatum					x		x				
	Stylidium dichotomum								x			
	Stylidium inundatum										x	
	Stylidium marradongense	P3					x					
	Stylidium petiolare										x	
	Stylidium piliferum							x	x	x	x	x
	Stylidium schoenoides								x			
	Stylidium uniflorum										x	
	Stylidium uniflorum subsp. *uniflorum*				x	x						
	Stylidium sp.							x			x	x
THYMELAEACEAE	*Pimelea ciliata*							x	x			x
	Pimelea imbricata							x				

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THYMELAEACEAE	*Pimelea preissii*					x						
(continued)	*Pimelea suaveolens*							x	x		x	
	Pimelea suaveolens subsp. *suaveolens*										x	
	Pimelea sp.							x			x	
TYPHACEAE	*Typha orientalis*							x			x	
	Typha domingensis									x		
VIOLACEAE	*Pigea floribunda*					x			x	x	x	
XANTHORRHOEACEAE	*Xanthorrhoea gracilis*							x	x	x	x	x
	Xanthorrhoea preissii					x		x	x	x	x	x
ZAMIACEAE	*Macrozamia riedlei*					x		x	x	x	x	x

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN RESIDUE EXPANSION AREAS

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: COO- Coolgardie; AVW – Avon Wheatbelt; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Andersonia sp. Saxatilis (F.J. Hort 3324)	Ericaceae	T	-	Habit: Erect shrub, to 0.6m high. Flower colour: white to pink Flowering period (indicated in green): J F M A M J J A S O **N** D Soils: Areas associated with Granite outcrops. IBRA Distribution: JAF Florabase records: 6	**Low to Moderate** as restricted to areas near Albany Highway and north-west of the Boddington area, but appears to be associated with granites
Anthocercis gracilis	Solanaceae	T	Vulnerable	Habit: Erect, spindly shrub, to 0.6 (-1) m high. Flower colour: yellow-green Flowering period (indicated in green): J F M A M J J A **S** **O** N D Soils: Sandy or loamy soils. Granite outcrops. IBRA Distribution: AVW, JAF Florabase records: 31	**Very Low** as mainly on escarpment near Perth with occasional outliers north of Albany Highway and north-east of Boddington
Caladenia dorrienii	Orchidaceae	T	Endangered	Habit: Tuberous, perennial, herb, 0.1-0.2 m high. Flower colour: white-cream-yellow Flowering period (indicated in green): J F M A M J J A **S** **O** **N** D Soils: Clayey loam. Moist sites adjacent to rivers and seasonal creeks. IBRA Distribution: AVW, JAF Florabase records: 17	**Low to Moderate a**s mainly species on moister sites adjacent to rivers and seasonal creeks, extends as occasional occurrence near Brookton Highway, but mainly south of Darkan in Wheatbelt
Caladenia hopperiana	Orchidaceae	T	Endangered	Habit: Tuberous, perennial, herb, up to 0.35m high. Flower colour: yellowish to creamy-white Flowering period (indicated in green): J F M A M J J A **S** **O** N D Soils: Wandoo woodlands, margins of seasonal creeks and swamps IBRA Distribution: JAF Florabase records: 4	**Low to Moderate,** as restricted to area southeast of Boddington in winter wet low lying valleys near swamp areas

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN RESIDUE EXPANSION AREAS

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: COO- Coolgardie; AVW – Avon Wheatbelt; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Diuris micrantha	Orchidaceae	T	Vulnerable	Habit: Tuberous, perennial, herb, 0.3-0.6 m high. Flower colour: yellow & brown Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: Brown loamy clay. Winter-wet swamps, in shallow water. IBRA Distribution: JAF, SWA Florabase records: 9	**Very Low** as restricted to area southwards near Darkan and on Swan Coastal Plain
Eleocharis keigheryi	Cyperaceae	T	Vulnerable	Habit: Rhizomatous, clumped perennial, grass-like or herb (sedge), to 0.4 m high. Flower colour: green Flowering period (indicated in green): J F M A M J J **A S O N** D Soils: Clay, sandy loam. Emergent in freshwater: creeks, claypans. IBRA Distribution: AVW, GES, JAF, SWA Florabase records: 59	**Very Low** as mainly species on Swan Coastal Plain, northern sandplains and in wider Wheatbelt
Morelotia australiensis	Cyperaceae	T	Vulnerable	Habit: Rhizomatous, tufted perennial, grass-like or herb (sedge), to 1 m high. Flower colour: brown Flowering period (indicated in green): J F M A M J J A S O **N D** Soils: Sand, sandy loam. Flats, well-drained areas. IBRA Distribution: JAF, SWA Florabase records: 49	**Low-Moderate** as restricted to mainly on fringes of Coastal Plain near Perth and Bunbury, with a few locations near Albany Highway

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Pultenaea pauciflora	Fabaceae	T	Vulnerable	Habit: Dense, much-branched shrub, to 0.8 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S **O N** D Soils: Sandy & clay lateritic soils. Undulating country. IBRA Distribution: AVW, JAF Florabase records: 50	**Low** as restricted to mainly within the Wheatbelt from west of Brookton to Narrogin, a few local plants east and southeast of Boddington
Verticordia fimbrilepis subsp. *fimbrilepis*	Myrtaceae	T	Endangered	Habit: Shrub, 0.3-0.7 m high. Flower colour: pink-white Flowering period (indicated in green): **J** F M A M J J A S **O N D** Soils: Gravelly or clayey soils. Flats, road verges. IBRA Distribution: AVW, JAF Florabase records: 39	**Low** as restricted to areas north of Albany Highway and then into wider Wheatbelt
Calytrix simplex subsp. *simplex*	Myrtaceae	P1	-	Habit: Shrub, ca 0.2 m high. Flower colour: purple Flowering period (indicated in green): J F M A M J J A S **O N** D Soils: IBRA Distribution: JAF, SWA Florabase records: 7	**Moderate** as recorded south of Boddington and has potential to occur in survey areas. Another main occurrence occurs closer to Perth and near Albany Highway
Darwinia hortiorum	Myrtaceae	P1		Habit: Low spreading shrub, ca 0.8 m high. Flower colour: Dull crimson Flowering period (indicated in green): J F M A M J J **A S O N D** Soils: IBRA Distribution: JAF Florabase records: 9	**Low** as recorded on granites near Albany Highway to the north-east on Monadnocks and near Wandering

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Gastrolobium sp. Prostrate Boddington (M. Hislop 2130)	Fabaceae	P1	-	Habit: Prostrate, mat-like shrub, to 0.05 m high. Flower colour: yellow/red Flowering period (indicated in green): J F M A M J J A S **O** N D Soils: Littered brown loam, clay, laterite. Lower slopes and rises, valley bottoms. IBRA Distribution: JAF Florabase records: 6	**Moderate-High** as recorded within th areas on the southern sections of the Newmont leases and near Boddington; although not recorded in previous detailed studies on the specific target areas
Hibbertia ambita	Dilleniaceae	P1	-	Habit: Erect to (rarely) sprawling shrubs 0.2–1.1 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A S O** N D Soils: Brown clay-loam soils over laterite. IBRA Distribution: JAF Florabase records: 17	**Moderate-High** as recorded near Boddington; as recently defined it depends on flowering material to ensure identification
Papistylus intropubens	Rhamnaceae	P1	-	Habit: Erect, slender shrub, to 0.5 m high. Flower colour: Flowering period (indicated in green): J F M A M J J A S O N D Soils: In heath. IBRA Distribution: JAF Florabase records: 1	**Low** as restricted to heath community south of Boddington, restricted to Tunnel Road Heath
Synaphea panhesya	Proteaceae	P1	-	Habit: Erect shrub, 0.3-0.6 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A S** O N D Soils: Gravelly loam & sandy gravel. IBRA Distribution: JAF, SWA Florabase records: 16	**Low** as recorded mainly north of Mundaring, with a recording Tunnel Road Heath in 1998

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Banksia recurvistylis	Proteaceae	P2	-	Habit: Non-lignotuberous shrubs to c. 2 m high Flower colour: pale yellow Flowering period (indicated in green): **J F** M A M J J A S O **N D** Soils: shallow, lateritic soils associated with granite outcrops IBRA Distribution: JAF Florabase records: 7	**Low to Moderate** as restricted mainly to areas near Albany Highway and north-west of the Boddington area, but appears to be associated with granites and has been recorded near Wandering
Grevillea crowleyae	Proteaceae	P2	-	Habit: Dense & spreading shrub, 0.5-1.5 m high. Flower colour: red Flowering period (indicated in green): J F M A M J J **A S O N** D Soils: Gravel. In gravel pit. IBRA Distribution: JAF Florabase records: 10	**Very Low** as mainly northeast and eastwards into Wheatbelt
Haloragis aculeolata	Haloragaceae	P2	-	Habit: Slender, erect perennial, herb, to 0.4 m high. Flower colour: green Flowering period (indicated in green): J F M A M J J A **S** O N **D** Soils: Black sand or clay over limestone. Winter-wet areas. IBRA Distribution: JAF, SWA Florabase records: 7	**Very Low** as mainly north-eastwards into Wheatbelt and on coastal plain south and north of Perth

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Logania sylvicola	Loganiaceae	P2	-	Habit: Erect to spreading compact multi-branched shrub 0.5m high. Flower colour: white to cream Flowering period (indicated in green): J F M A M J J **A S** O N D Soils: laterite rises associated with brown clay to clayey sand IBRA Distribution: JAF Florabase records: 8	**Very Low** as mainly southwards of Boddington and into Wheatbelt
Asteridea gracilis	Asteraceae	P3	-	Habit: Annual, herb, 0.15-0.35 m high. Flower colour: white-pink Flowering period (indicated in green): J F M A M J J A **S O N D** Soils: Sand, clay, gravelly soils. IBRA Distribution: ESP, JAF, SWA Florabase records: 11	**Low to Moderate** as south of Boddington; although mainly near Perth and north of Mundaring with a few outliers on southern coast
Banksia subpinnatifida var. *imberbis*	Proteaceae	P3	-	Habit: Erect or straggling, non-lignotuberous shrub, 0.3-1.5 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: Laterite. IBRA Distribution: AVW, JAF Florabase records: 17	**Moderate to Hig**h as recorded near Boddington in Tunnel Road heath; although mainly south within Wheathelt

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Byblis gigantea	Byblidaceae	P3	-	Habit: Small, branched perennial, herb (or sub-shrub), to 0.45 m high. Flower colour: pink-purple/white Flowering period (indicated in green): **J** F M A M J **J** A **S** **O** **N** **D** Soils: Sandy-peat swamps. Seasonally wet areas. IBRA Distribution: JAH, SWA, GES Florabase records: 49	**Low to Moderate** as mainly near Perth and north of Albany Highway with occasional occurrence south of Boddington
Goodenia katabudjar	Goodeniaceae	P3	-	Habit: Shrub (subshrub), 0.1-0.2 m high, stems hirsute; leaves entire, basal leaves absent; corolla hairy outside; sepals 5.5-7 mm long. Flower colour: blue-pink/white Flowering period (indicated in green): J F M A M J J A S O N **D** Soils: Sandy gravel. Upland areas of open wandoo woodland. IBRA Distribution: JAF Florabase records: 12	**Moderate to High** as been recorded previously near Boddington and Wandering; although on the eastern fringes of the Jarrah forest
Grevillea dissectifolia	Proteaceae	P3	-	Habit: Spreading, virgate shrub, 1.5-3(-5) m high, up to 3 m wide. Fl. Flower colour: white & red & brown Flowering period (indicated in green): J F M A M **J** J A **S** O **N** D Soils: Gravelly loam, moist. Roadsides. IBRA Distribution: JAF Florabase records: 24	**Low to Moderate** as occurs south of Albany Highway near Bannister, but mainly north of Albany Highway

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Hakea oldfieldii	Proteaceae	P3	-	Habit: Open, straggling shrub, up to 2.5 m high. Flower colour: white-cream/yellow Flowering period (indicated in green): J F M A M J J **A S O** N D Soils: Red clay or sand over laterite. Seasonally wet flats. IBRA Distribution: AVW, ESP, JAF, MAL, SWA Florabase records: 66	**Low to Moderate** as mainly recorded near Bunbury, north-west of Boddington and in wider southern Wheatbelt
Halgania corymbosa	Boraginaceae	P3	-	Habit: Erect shrub, 0.35-1 m high. Flower colour: blue-purple Flowering period (indicated in green): J F M A M J J **A S O N** D Soils: Gravelly soils, soils over granite. IBRA Distribution: JAF, SWA Florabase records: 18	**Low to Moderate** as has been recorded south of Albany Highway on Saddleback Tree Farm and in Newmont leases; although largely near Perth and north-eastwards
Hemigenia microphylla	Lamiaceae	P3	-	Habit: Slender shrub, 0.4-1.8 m high. Flower colour: blue-purple Flowering period (indicated in green): J F M A M J J A **S O N D** Soils: Sandy clay, peaty clay, granite. Winter-wet depressions. IBRA Distribution: JAF, SWA, WAR Florabase records: 26	**Low** as mainly recorded on Swan Coastal Plain and southwards from Bridgetown; although recorded west of survey areas in central Jarrah forest
Lasiopetalum caroliae	Malvaceae	P3	-	Habit: Erect shrub, 0.6–2(–3) m high Flower colour: pink Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: yellow-brown, sandy loam and lateritic gravel soils IBRA Distribution: JAF, SWA Florabase records: 19	**Low** as mainly near Brookton and north-east of Perth

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Meionectes tenuifolia	Haloragaceae	P3	-	Habit: Annual semi-aquatic herb, to 0.35 m high. Flower colour: orange-red-brown, green Flowering period (indicated in green): J F M A M J J A **S O N D** Soils: Grey sand or grey-brown clay, shallow soils. Seasonally inundated flat, edge of swamp. IBRA Distribution: JAF, SWA Florabase records: 28	**Low** as mainly recorded on Swan Coastal Plain and northwards from Perth om ranges, occasional occurrence south of Boddington and southwards in western fringes of Wheatbelt
Netrostylis sp. Blackwood River (A.R. Annels 3043)	Cyperaceae	P3	-	Habit: Perennial sprawling to erect sedge Flower colour: brown Flowering period (indicated in green): J F M A M J J A S O N D Soils: Wet in inundated areas or along creeks IBRA Distribution: ESP, JAF, SWA, WAR Florabase records: 17	**Low** as mainly recorded on Swan Coastal Plain and in southern forests and southern Wheatbelt, occasional occurrence south of Boddington and southwards in Wheatbelt
Stylidium marradongense	Stylidiaceae	P3	-	Habit: Erect perennial, herb, 0.15-0.5 m high Flower colour: white/pink Flowering period (indicated in green): J F M A M J J A **S O N** D Soils: Sand over laterite. Jarrah-Marri forest. IBRA Distribution: AVW, JAF Florabase records: 15	**Moderate-High**, recorded near Boddington and also extends southwards into Wheatbelt
Tetratheca similis	Elaeocarpaceae	P3	-	Habit: Spreading shrub, to 0.3 m high. Flower colour: pink Flowering period (indicated in green): J F M A M J J **A S** O N D Soils: Sandy clay with lateritic boulders. IBRA Distribution: AVW, JAF Florabase records: 22	**Low**, recorded on fringes of forest and Wheatbelt to the north of Albany Highway

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Thysanotus cymosus	Asparagaceae	P3	-	Habit: Perennial herb, to 0.3 m high. Flower colour: purple Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: Clay, granitic or lateritic sand IBRA Distribution: AVW, ESP, JAF, WAR, MAL Florabase records: 31	**Moderate**, recorded on fringes of forest near Albany Highway, north of Albany Highway and Wheatbelt
Acacia alata var. *platyptera*	Fabaceae	P4	-	Habit: Dense shrub, 0.5-1 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M **J J A** S O N D Soils: Clay, gravelly sandy clay. Lateritic ridges, clay flats. IBRA Distribution: AVW, JAF, SWA Florabase records: 33	**Low,** mainly on fringes of forests and in Wheatbelt
Acacia cuneifolia	Fabaceae	P4	-	Habit: Erect or straggly shrub, 1-3 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J **J A S O** N D Soils: Sand, clay or loam over granite. Granite outcrops & hills, rocky watercourses. IBRA Distribution: AVW, JAF Florabase records: 41	**Low,** mainly on fringes of forests and in Wheatbelt
Acacia oncinophylla subsp. *patulifolia*	Fabaceae	P4	-	Habit: Shrub, 0.5-2.5(-3) m high, 'minni-ritchi' bark, phyllodes 4-9 cm long, 3-6 mm wide. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A S O N D** Soils: Granitic soils, occasionally on laterite. IBRA Distribution: JAF, SWA Florabase records: 31	**Low**, mainly on Darling Scarp and then on fringes of Wheatbelt north and south of Boddington

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Banksia insulanemorecincta	Proteaceae	P4	-	Habit: Non-lignotuberous shrub, to 1 m high. Flower colour: cream Flowering period (indicated in green): J F M A M **J J A S** O N D Soils: Yellow sand, clay, gravel, laterite, granite. Open scrubby flat, slopes, low heath. IBRA Distribution: JAF Florabase records: 20	**Low,** north of Albany Highway
Caladenia integra	Orchidaceae	P4	-	Habit: Tuberous, perennial, herb, 0.2-0.5 m high. Flower colour: green & red Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: Clayey loam. Granite outcrops, rocky slopes. IBRA Distribution: AVW, ESP, GES, JAF, MAL Florabase records: 49	**Low,** near Albany Highway, mainly on fringes of forests and in Wheatbelt
Calothamnus quadrifidus subsp. *teretifolius*	Myrtaceae	P4	-	Habit: Shrub to 5 m tall, with or without lignotuber. Flower colour: red Flowering period (indicated in green): J F M A M J J A **S O N D** Soils: clay with ironstone, wet in winter IBRA Distribution: JAF, SWA Florabase records: 47	**Low**, mainly south of Bunbury, with occasional collection on Mt Saddleback

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Chorizema ulotropis	Fabaceae	P4	-	Habit: Sprawling, open, semi-prostrate shrub, to 0.45 m high. Flower colour: orange-yellow Flowering period (indicated in green): J F M A M J **J A S** O N D Soils: Moist to dry soils, white sand with gravel, laterite, granite. Outcrops, winter damp to dry areas, flats. IBRA Distribution: ESP, JAF, MAL Florabase records: 24	**Low-Moderate**, mainly southern Wheatbelt with a few in northern Jarrah Forest
Cyanothamnus tenuis	Rutaceae	P4	-	Habit: Procumbent or erect & slender shrub, 0.1-0.5 m high. Flower colour: blue/pink-white Flowering period (indicated in green): J F M A M J J **A S O N** D Soils: Laterite, stony soils, granite. IBRA Distribution: JAF, SWA Florabase records: 45	**Low-Moderate,** mainly in northern Jarrah forest, Darling Scarp, near Bunbury on coastal plain and isolated occurrence on clay soils near Hotham River south of Boddington
Darwinia pimelioides	Myrtaceae	P4	-	Habit: Erect shrub, 0.25-0.5(-1) m high. Flower colour: red/pink & green Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: Loam, sandy loam. Granite outcrops. IBRA Distribution: Florabase records: 28	**Very Low**, mainly near Darling Scarp northeast of Perth, occasional occurrence near Quindanning

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Darwinia sp. Dryandra (G.J. Keighery 9295)	Myrtaceae	P4	-	Habit: Dense shrub, 0.1-0.45 m high. Flower colour: white Flowering period (indicated in green): **J F M A M J** J A S O **N** D Soils: Gravelly clay. Lateritic ridges. IBRA Distribution: AVW, JAF Florabase records: 18	**Low**, mainly in Wheatbelt, with a few occurrences on eastern fringes of forests
Darwinia thymoides subsp. St Ronans (J.J. Alford & G.J. Keighery 64)	Myrtaceae	P4	-	Habit: Shrub, c. 0.2 m high. Flower colour: red Flowering period (indicated in green): **J** F M A M J J A S O **N** D Soils: Grey clay/gravel over granite or sand over laterite. Hilltop, exposed granite site. IBRA Distribution: JAF Florabase records: 25	**Low to Moderate,** one recorded just west of Gold mine, but mainly northwards on the eastern fringes of the forest and the Wheatbelt
Drosera occidentalis	Droseraceae	P4	-	Habit: Fibrous-rooted, rosetted perennial, herb, to 0.025 m high. Flower colour: pink/white Flowering period (indicated in green): **J** F M A M J J A S **O N D** Soils: White/black sand over yellow clay, yellow sand, moist brown/grey clay/sand, peaty sand, sandy clay. Damp flats, flood plain. IBRA Distribution: JAF, SWA Florabase records: 23	**Low to Moderate**, mainly near Darling Scarp near Perth, occasional occurrence in central forest areas and south of Boddington

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Eucalyptus exilis	Myrtaceae	P4	-	Habit: 2-6 m high, bark smooth. Flower colour: white Flowering period (indicated in green): J F M A M J J **A S O** N D Soils: Grey sand, gravelly loam. Lateritic ridges. IBRA Distribution: AVW, GES, JAF Florabase records: 48	**Low**, mainly on northern sandplains to north of Perth and on northern fringes of forest and Wheatbelt north of Albany Highway
Gastrolobium ovalifolium	Fabaceae	P4	-	Habit: Prostrate, spreading shrub, to 0.1 m high. Flower colour: orange & purple & yellow & red Flowering period (indicated in green): J F M A M J J **A S** O N D Soils: Sandy clay. Gravelly hills. IBRA Distribution: AVW, JAF Florabase records: 24	**Low**, mainly in Wheatbelt, with a few occurrences on eastern fringes of forests to north of Albany Highway
Hydrocotyle lemnoides	Araliaceae	P4	-	Habit: Aquatic, floating annual, herb. Flower colour: purple Flowering period (indicated in green): J F M A M J J **A S O** N D Soils: Swamps. IBRA Distribution: AVW, GES, JAF, SWA Florabase records: 26	**Low**, mainly near Perth and north of main forests, with a few occasional outliers
Lasiopetalum bracteatum	Malvaceae	P4	-	Habit: Erect, open shrub, 0.4-1.5 m high. Flower colour: pink purple Flowering period (indicated in green): J F M A M J J **A S O N** D Soils: Along drainage lines, creeks, gullies, granite outcrops IBRA Distribution: JAF, SWA Florabase records: 45	**Moderate**, mainly occurs on eastern fringes of the forest with a few occurrences into the Wheatbelt

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN RESIDUE EXPANSION AREAS

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: COO- Coolgardie; AVW – Avon Wheatbelt; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Lasiopetalum cardiophyllum	Malvaceae	P4	-	Habit: Erect, multi-stemmed shrub, 0.2-0.5 m high. Flower colour: pink Flowering period (indicated in green): **J F M A M J J A S O N D** Soils: Lateritic gravelly soils, sandy clay. Flats, hillslopes. IBRA Distribution: AVW, JAF Florabase records: 34	**High**, mainly occurs on eastern fringes of the forest with a few occurrences into the Wheatbelt
Ornduffia submersa	Menyanthaceae	P4	-	Habit: Aquatic, extremely slender perennial, herb. Flower colour: white Flowering period (indicated in green): **A S O N** Soils: In freshwater 0.05 to 0.6m deep. Pools, lakes, swamps, winter-wet depressions, claypans. IBRA Distribution: AVW, ESP, JAF, SWA, WAR Florabase records: 61	**Low**, mainly on Swan Coastal Plain and then on fringes of forest and Wheatbelt
Parsonsia diaphanophleba	Apocynaceae	P4	-	Habit: Woody climber, to 10 m high. Flower colour: white/cream & pink Flowering period (indicated in green): **J F M A M J** Soils: Alluvial soils. Along rivers. IBRA Distribution: JAF, SWA Florabase records: 28	**Low,** mostly on Swan Coastal Plain with a few outliers and one record west of gold mine
Schoenus natans	Cyperaceae	P4	-	Habit: Aquatic annual, grass-like or herb (sedge), 0.3 m high. Flower colour: brown Flowering period (indicated in green): **O** Soils: Winter-wet depressions. IBRA Distribution: AVW, GES, JAF, SWA, WAR Florabase records: 66	**Very Low,** throughout southwest, but not near Boddington

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN RESIDUE EXPANSION AREAS

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Senecio leucoglossus	Asteraceae	P4	-	Habit: Erect annual, herb, to 1.3 m high. Flower colour: white Flowering period (indicated in green): J F M A M J J **A S O N D** Soils: Gravelly lateritic or granitic soils. Granite outcrops, slopes. IBRA Distribution: JAF, SWA, WAR Florabase records: 45	**Moderate**, widespread in northern forest with a few outliers on Swan Coastal Plain