

# ASSESSMENT OF FLORA AND VEGETATION VALUES

## ALCOA OF AUSTRALIA WARRINGTON SURVEY AREA, WA

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Prepared By



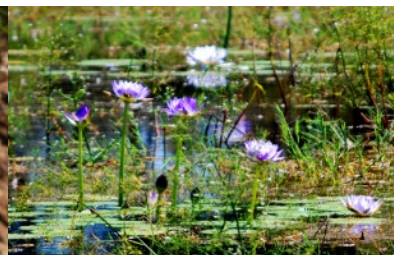
**Mattiske** Consulting Pty Ltd

Prepared For

**Alcoa of Australia Limited**

**September 2023**

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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)

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## EXECUTIVE SUMMARY

Mattiske Consulting Pty Ltd was commissioned in 2023 by Alcoa of Australia Ltd (Alcoa) to conduct a desktop assessment to evaluate the potential flora and vegetation values of the Willowdale-Larego expansion survey area, namely Warrington, located approximately 116 km south east of Perth, WA. The Warrington survey area consists of 21 blocks totalling 1,134 hectares, located south- east of the existing Willowdale bauxite mining operation and within tenements ML 1S4, E 70/2338, E 70/5390 and E 70/5543. The survey areas have been assessed by Mattiske Consulting Pty Ltd at a regional mapping scale as part of the Regional Forest Agreement (RFA) project by Mattiske and Havel (1998).

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 Warrington survey area. Historical documentation of the floristics and vegetation mapping of the region, along with results of previous flora and vegetation surveys in the nearby areas, were reviewed.

The Warrington survey area occurs 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. The vegetation of the region has been extensively studied, and has been described in a series of vegetation complexes of the Darling System by Heddl *et al.* (1980) and Mattiske and Havel (1998).

### Potential Flora Values

A total of 578 vascular plant taxa, representative of 216 genera and 80 families, have the potential to occur within the Warrington survey area. The most commonly represented families in the Warrington area are Fabaceae (77 taxa), Proteaceae (45 taxa) and Myrtaceae (43 taxa). The most commonly represented genera in the Warrington area are *Acacia* (27 taxa), *Stylidium* (19 taxa), *Hibbertia* (15 taxa) and *Lomandra* (17 taxa).

A total of 49 introduced taxa has the potential to occur in the Warrington survey area. Only one of the potential weeds *\*Rubus ulmifolius* as listed under the *\*Rubus fruticosus* aggregate, is a Weed of National Significance (DAFF, 2023). *\*R. ulmifolius* is also a declared pest/organism under the *Biosecurity and Agriculture Management Act 2007* (WA) (DPIRD 2023).

### Recorded Flora Values

A total of 238 vascular plant taxa, representative of 111 genera and 45 families, were recorded in the Warrington survey area. The most commonly represented families in the Warrington area are Fabaceae (32 taxa), Proteaceae (21 taxa) and Myrtaceae (16 taxa). The most commonly represented genera in the Warrington area are *Acacia* (27 taxa), *Stylidium* (19 taxa), *Hibbertia* (15 taxa) and *Lomandra* (17 taxa).

A total of 5 introduced taxa were recorded in the Warrington survey area. None of the weeds were Weeds of National Significance (DCCEEW, 2023) or declared pest/organism under the *Biosecurity and Agriculture Management Act 2007* (WA) (DPIRD 2023). One of these 5 species was the planted *\*Pinus* species.

### Potential Vegetation Values

No Threatened Ecological Communities (TECs) occur in the Warrington survey areas. The desktop assessment did highlight one community which may occur, the *Banksia Woodland of the Swan Coastal Plain*; however this is restricted to the Swan Coastal Plain and as such does not extend into the Jarrah forest area on the Darling Ranges.

The Warrington survey area occurs within the Regional Forest Agreement (RFA) area of the southwest forests DCCEEW (2023a) and as such was considered during the RFA process.

### **Recorded Vegetation Values**

Hedde *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 Warrington survey area.

A total of 15 site-vegetation types and 1 cleared area were defined and mapped in the Warrington survey area (excluding the already cleared (CL) areas). The site-vegetation types were subdivided into three 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 areas and the creeklines differ markedly from the forest and woodland areas on the slopes and ridges. The Warrington area differed from some other areas near the Willowdale area as sections are dominated by creeklines and associated valley systems.

The majority of the vegetation was ranked as very good despite historical harvesting activities, recent intense fires, dieback and some established tracks and one restricted cleared area. The presence of the dieback disease is particularly evident in the condition of the vegetation on the lower slopes that support D, PW and SW site-vegetation types.

### **Potential 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 lower slopes of the Yarragil (Yg1 and Yg2) 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.

### **Potential Old Growth Forest Areas**

There are no patches of old growth forests occurring in the Warrington survey area as supplied by the Department of Biodiversity, Conservation and Attractions.

## 1. INTRODUCTION

Mattiske Consulting Pty Ltd was commissioned in 2023 by Alcoa of Australia Ltd (Alcoa) to conduct a desktop assessment to evaluate the potential flora and vegetation values of the Warrington survey area. The purpose of the assessment was to provide information pertaining to mining approvals. This desktop assessment was then followed by detailed mapping of the areas within the Warrington survey area.

### 1.1. Location and Scope of Project

The Warrington survey area occurs within the Northern Jarrah Forest subregion of the Southwest Botanical Province (Beard 1990), approximately 116 km south east of Perth, WA (Figure 1). The Warrington survey area is located approximately 7 km south-east of the existing Willowdale bauxite mine and intersects tenements ML 154, E 70/2338, E 70/5390 and E 70/5543 (Figure 2).

Parts of this region have previously been surveyed by E. M. Mattiske and Associates (1993 to 1994) and Mattiske Consulting Pty Ltd (1996 to 2022) at a regional mapping scale as part of the Regional Forest Agreement (RFA) project by Mattiske and Havel (1998). These studies built on the earlier work of Havel (1975a and 1975b) in the northern Jarrah Forest.

This report describes the potential and recorded flora and vegetation values of the Warrington survey area 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 2022*
- *Biodiversity Conservation Act 2016* (BC Act) and *Regulations 2018*;
- *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.



**Legend**  
 Survey Area

**LOCALITY**

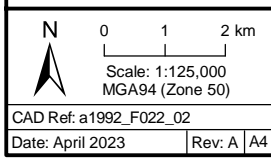
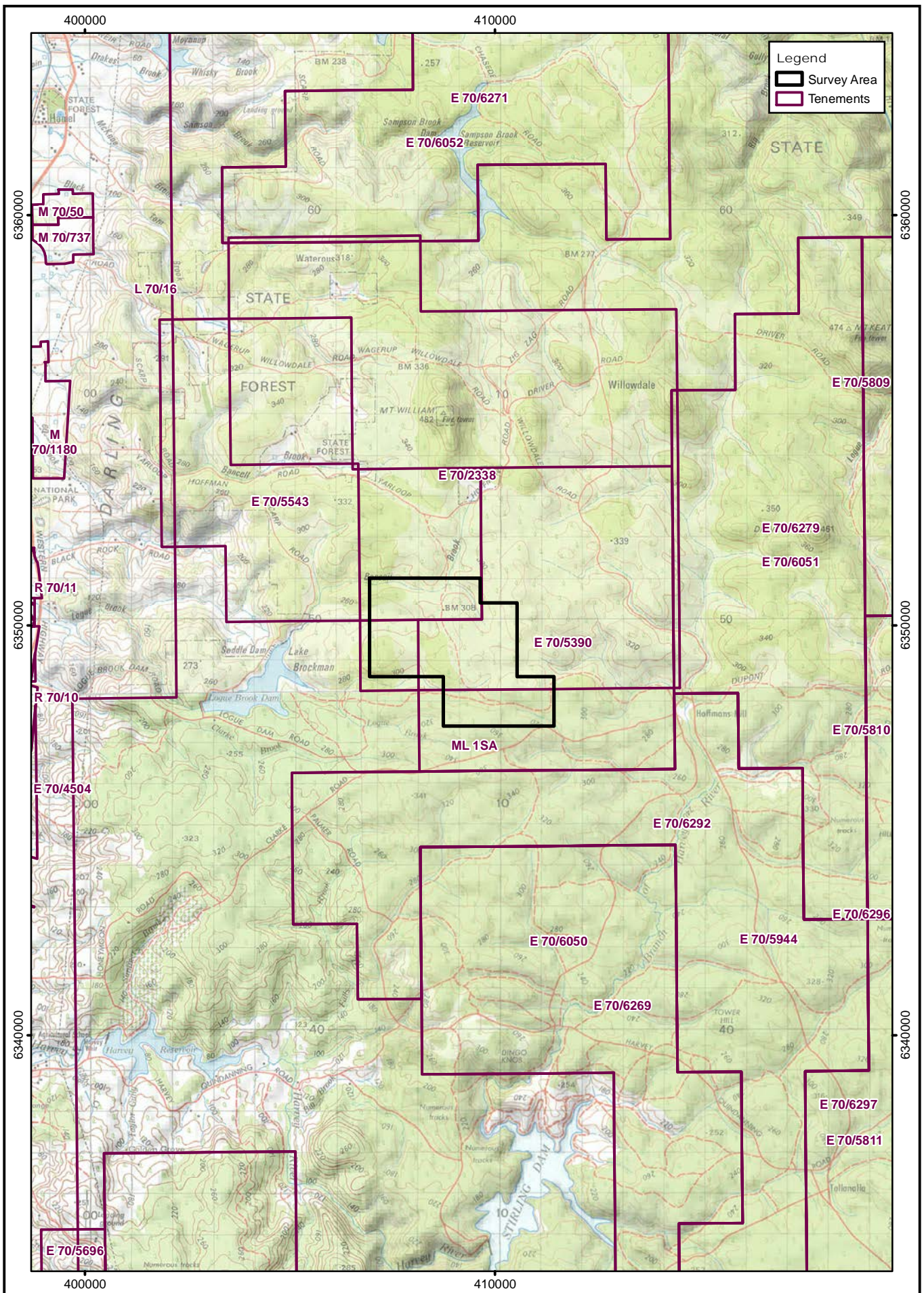
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 PROJECT AREA

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 Date: April 2023

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**Warrington Survey Area  
 Location**

Figure:  
**1**




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**Warrington Survey Area**  
**Tenements**

Figure: **2**

CAD Ref: a1992\_F022\_02  
 Date: April 2023 Rev: A | A4

## 2. OBJECTIVES

The objective of this assessment was to undertake the desktop component of a detailed flora and vegetation survey of the Warrington survey area, including:

- Undertake a desktop assessment of the flora and vegetation of the Warrington survey area, with an emphasis on threatened and priority flora, and threatened and priority ecological communities;
- Undertake a detailed assessment of the flora and vegetation of the Warrington survey area, with an emphasis on threatened and priority flora, and threatened and priority ecological communities;
- Review previous literature and current databases associated with the Warrington survey area;
- Review the conservation status of the vascular plant species recorded by reference to current literature and current listings by the Department of Biodiversity, Conservation and Attractions (DBCA 2022a) and plant collections held at the Western Australian Herbarium ([WAH] 1998 -), and plants listed by the Department of Climate Change, Energy and the Environment and Water [DCCEEW] (2023a) under the EPBC Act; and
- Prepare a report summarising the findings.

## 3. METHODS

### 3.1. Desktop Assessment

A desktop assessment was undertaken in April 2023 using FloraBase (WAH 1998-), NatureMap (DBCA 2007- ) and the *EPBC Act* Protected Matters Search Tool (PMST) (DCCEEW 2023a) databases, to identify the possible occurrence of flora (including threatened and priority taxa) and threatened and priority ecological communities within the Warrington survey area. The NatureMap search (02-0423NM) was requested through the DBCA's interim biodiversity platform (email) with a 10 km search buffer applied to the following co-ordinate;

- -32°59'4.53"S, 116° 1'33.78"E

The PMST search was also completed on the above co-ordinate, with a 5 km buffer applied. 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 Consulting Pty Ltd (2015-2022) within or adjacent to the survey area were included. Summary of the vascular plant species recorded through these various databases are summarised in Appendices B and C.

Additionally, the land systems, Pre-European vegetation, vegetation complexes and Site Vegetation types as well as the presence of dieback and Old- growth were identified. Historical documentation and vegetation mapping of the Northern Jarrah Forest subregion that provide resource material for the floristics and vegetation of the Warrington area was reviewed, including Mattiske Consulting Pty Ltd (2015-2022) reports on their flora and vegetation surveys in the nearby Larego survey areas. Nomenclature of flora species was checked against and is consistent with Florabase (WAH 1998- ).

### 3.2. Field studies

Field studies were undertaken at 772 sites on the 120m grid systems within the approximate 1134 ha of the Warrington survey area.

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 Heddlé *et al.* (1980). Sites were pre-designated using a 120 x 120 m grid system overlaid on the survey area. A total of 772 sites within the 1134 ha area were assessed with recordings on the trees (20m radius) and understorey (5m radius).

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	<i>Phytophthora</i> 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. raphiophylla*, *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.

#### ***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

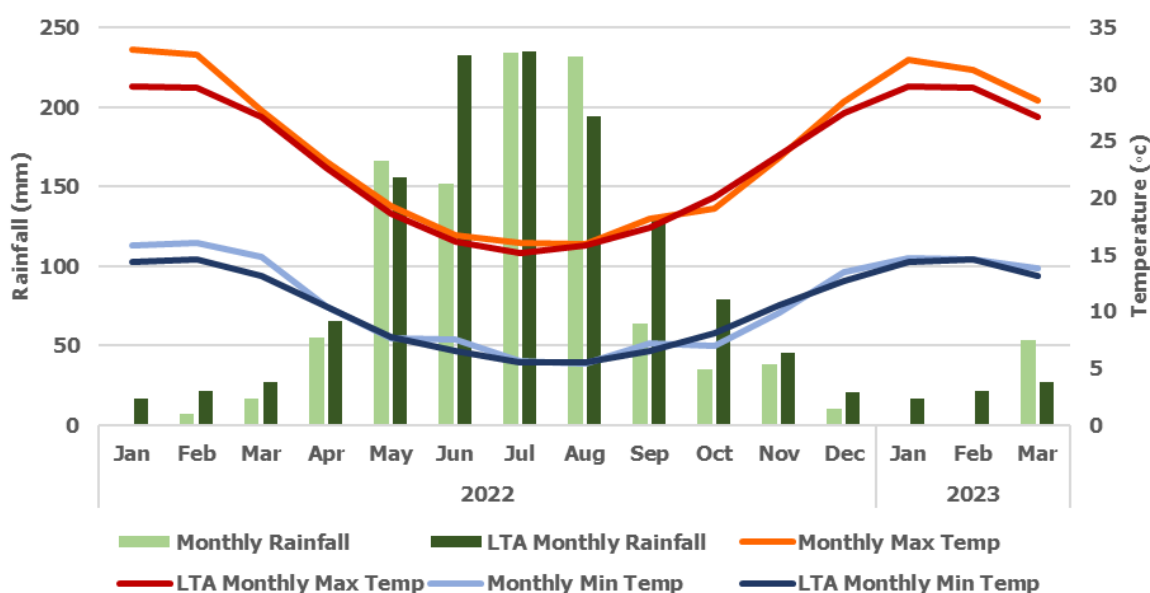
All plant specimens collected during the field survey were dried and processed in accordance with the requirements of the Western Australian Herbarium (WAH). All plant specimens were identified through comparisons with pressed specimens housed at the WAH. Where appropriate, plant taxonomists with specialist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

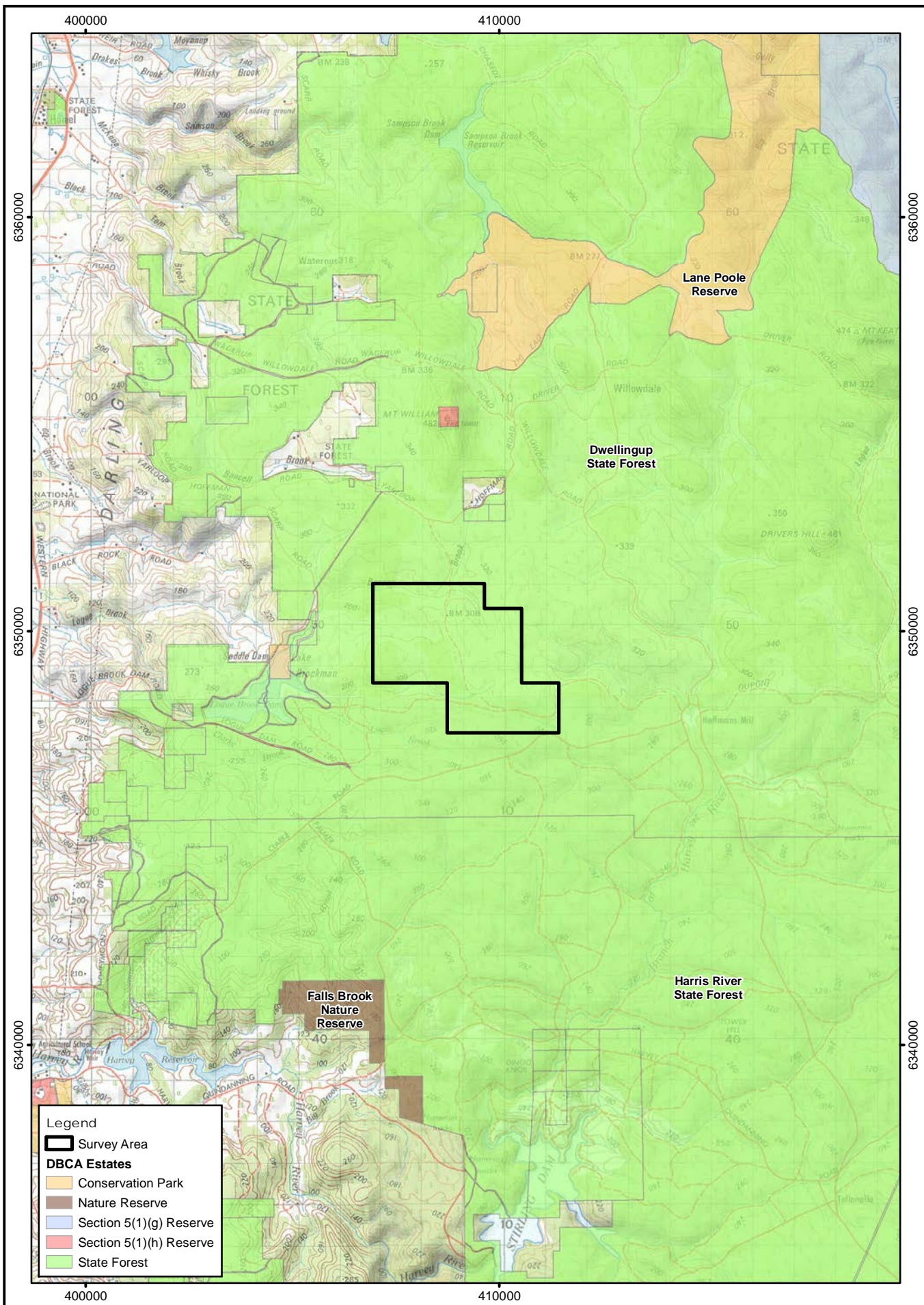
The survey area lies at the southern end of the Northern Jarrah Forest subregion. Beard (1990) described the climate of this area as being warm Mediterranean, with rainfall of 600 – 1200 mm per annum and 5 - 6 dry months per year. Long-term and recent climatic data from BOM’s Dwellingup weather station (Stn. No. 9538) is shown in Figure 3. Annual average rainfall at Dwellingup (1934 -2023) is 1224.5 mm (Bureau of Meteorology [BOM] 2023). Rainfall in 2022 was highest in August 2022 than the longer-term mean; although the summer months were again drier (Figure 3).



**Figure 3: Climatic data for the Warrington survey area**  
 Long-term rainfall and temperature data from the Dwellingup weather stations respectively (ID 009538 respectively, years 1934-2023) (BOM 2023).

##### 4.2. DBCA Estates

The Warrington survey area is situated in the Dwellingup State Forest (Figure 4).



**Legend**

- Survey Area
- DBCA Estates**
- Conservation Park
- Nature Reserve
- Section 5(1)(g) Reserve
- Section 5(1)(h) Reserve
- State Forest

N  
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 Scale: 1:125,000  
 MGA94 (Zone 50)

CAD Ref: a1992\_F022\_03  
 Date: April 2023

Rev: A | A4

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**Warrington Survey Area**  
**DBCA Estates**

Figure:  
4

### 4.3. Geology, Soils and Topography

The Warrington survey area is 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 two main landform and soil units occurring within the survey areas, these are:

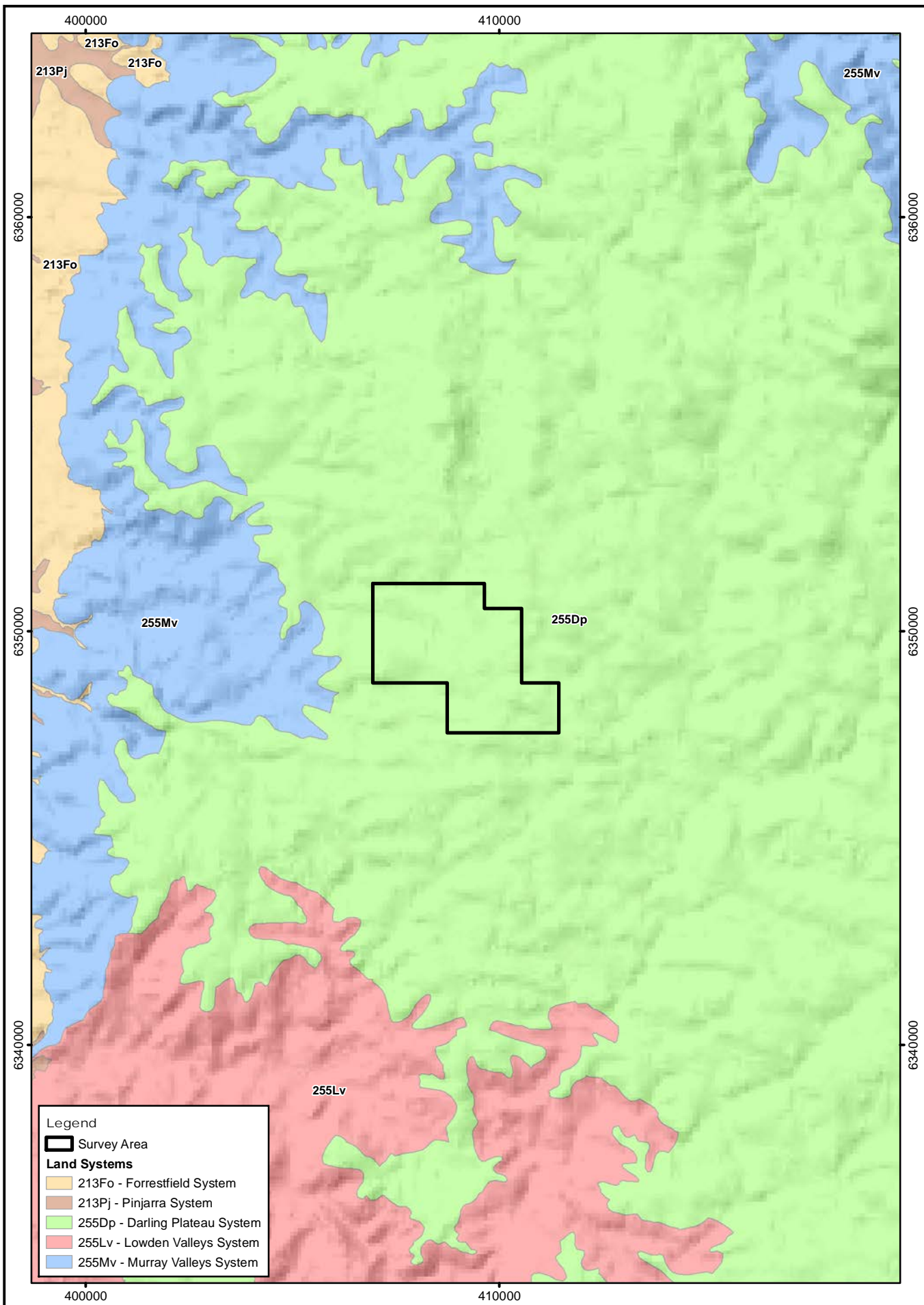
- Dwellingup:** Gently undulating landscape with duricrust on ridges; sands and gravels in shallow depressions.
- Yarragil:** Valleys of the western part of the plateau; sandy gravels on the slopes; orange earth in swampy floors.

The Department of Primary Industries and Regional Development's (DPIRD) Land Systems present within the Warrington survey areas (Figure 5, Table 1) includes the Darling Plateau System (255Dp) with two other land systems in nearby areas:

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 Warrington survey area**

Land System	Mapping Unit	Total Extent (ha)	Area of Intersection with the Warrington survey area	Proportion of Current Extent (%)
Darling Plateau System	255Dp	820265.7327	1134.01	0.14



**Legend**

- Survey Area
- Land Systems**
- 213Fo - Forrestfield System
- 213Pj - Pinjarra System
- 255Dp - Darling Plateau System
- 255Lv - Lowden Valleys System
- 255Mv - Murray Valleys System

N

0 1 2 km

Scale: 1:125,000  
MGA94 (Zone 50)

CAD Ref: a1992\_F022\_04  
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**Warrington Survey Area  
Land Systems**

#### 4.4. Regional Vegetation

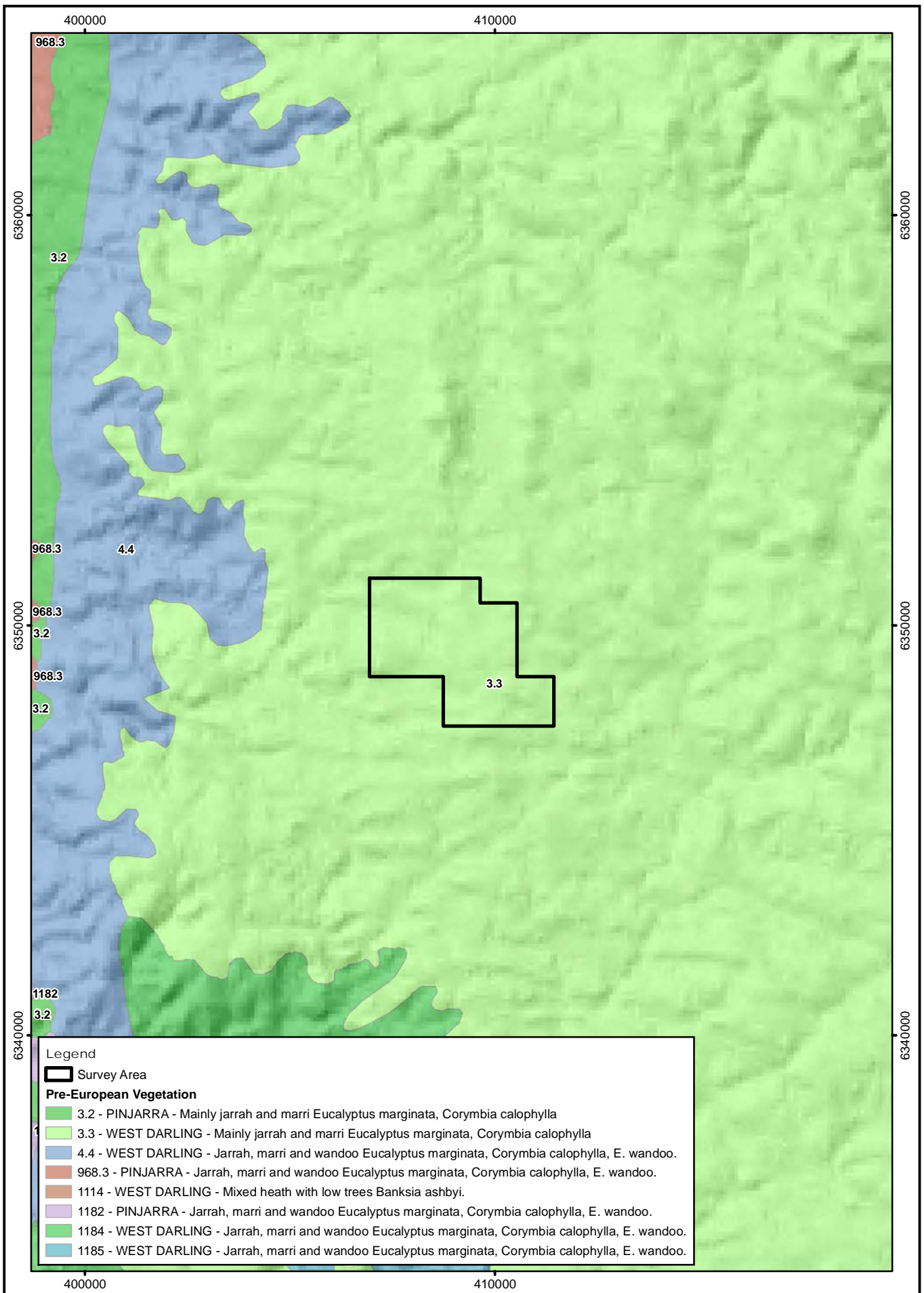
The survey area is situated within Beard's (1990) Northern Jarrah Forest subregion of the Southwest Province. The Northern Jarrah Forest subregion is characterised by Jarrah (*Eucalyptus marginata*) forest on ironstone gravels and Marri-Wandoo (*Corymbia calophylla* - *Eucalyptus wandoo*) woodlands on 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 Warrington survey area (Figure 6, Table 2) include:

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

**Table 2: Extent of pre-European vegetation associations intersecting the Warrington survey area**

System	Vegetation Association	State-wide Pre-European Extent (ha)	Area of Intersection with the Warrington survey area (ha)	Proportion of Current Extent (%)
West Darling	3.3	485225.883	1134.01	0.23



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**Warrington Survey Area**  
**Pre-European Vegetation**

Figure:  
**6**

Hedde *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 three vegetation complexes in the Warrington survey area (Figure 7, Table 3). These include:

**Dwellingup 1 (D1):** Open Forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on lateritic uplands in mainly humid and subhumid zones.

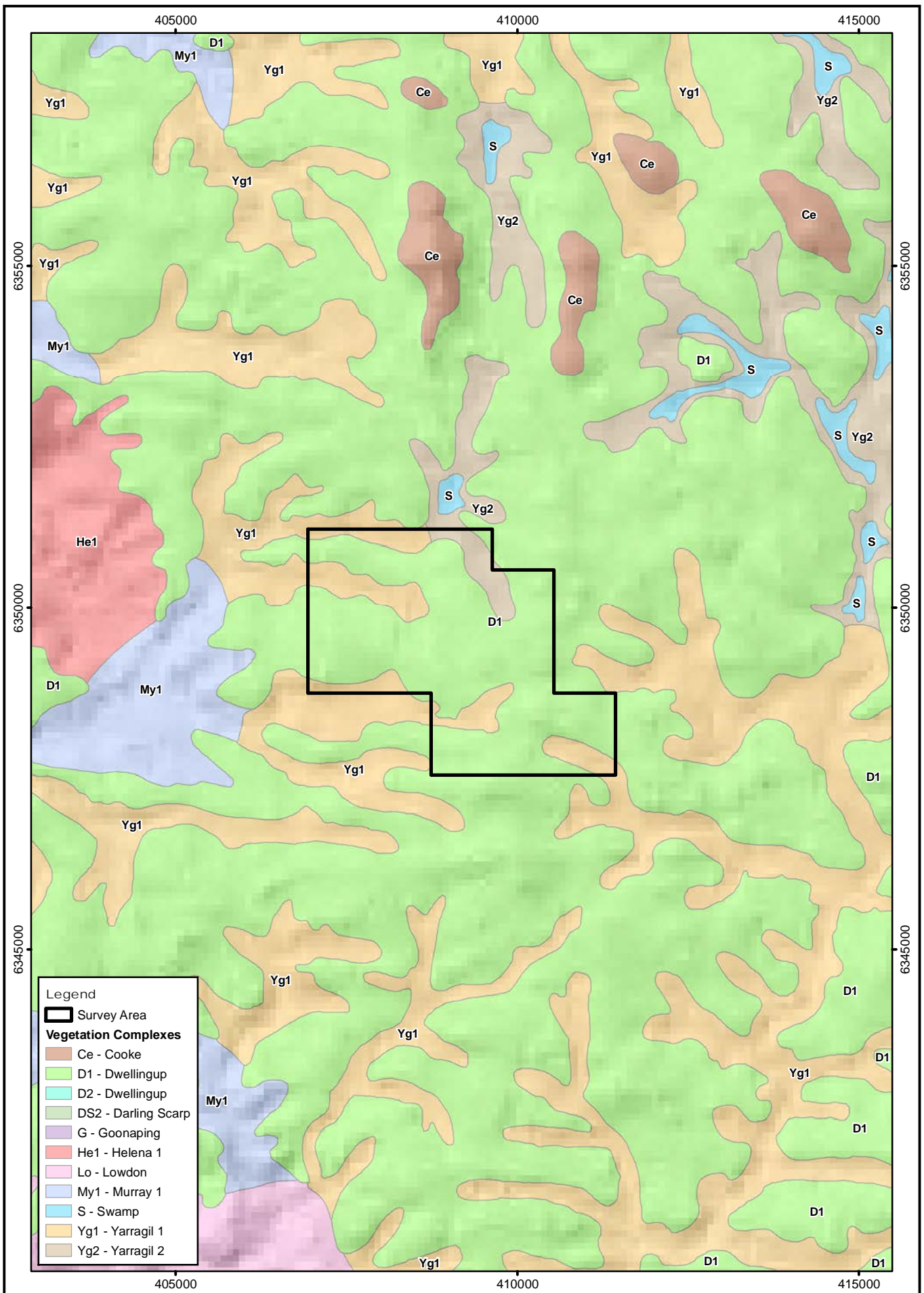
**Yarragil 1 (Yg1):** Open Forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on slopes with mixtures of *Eucalyptus patens* and *Eucalyptus megacarpa* on the valley floors in humid and subhumid zones.

**Yarragil 2 (Yg2):** Open Forest of *Eucalyptus marginata* subsp. *thalassica* – *Corymbia calophylla* on slopes, woodland of *Eucalyptus patens* – *Eucalyptus rudis* with *Hakea prostrata* and *Melaleuca viminea* on valley floors in subhumid and semiarid zones.

**Table 3: Extent of Vegetation Complexes intersecting the Warrington survey area**

Vegetation Complex	Vegetation Class	Total Extent (ha)	Area of Intersection with the Warrington survey area (ha)	Proportion of Regional Extent (%)
Dwellingup 1	D1	297624.85	869.360	0.29
Yarragil 1	Yg1	113828.12	208.404	0.18
Yarragil 2	Yg2	71234.37	56.247	0.08

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 (DCCEE 2023b). 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).



**Legend**

Survey Area

**Vegetation Complexes**

- Ce - Cooke
- D1 - Dwellingup
- D2 - Dwellingup
- DS2 - Darling Scarp
- G - Goonaping
- He1 - Helena 1
- Lo - Lowdon
- My1 - Murray 1
- S - Swamp
- Yg1 - Yarragil 1
- Yg2 - Yarragil 2

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**Warrington Survey Area  
Vegetation Complexes**

Figure:

**7**

#### 4.5. Potential Flora

A total of 548 vascular plant taxa, representative of 216 genera and 80 families, have the potential to occur within the wider Warrington survey area (inclusive of Larego surveys 2015-2022). The most commonly represented families are Fabaceae (71 taxa), Myrtaceae (43 taxa), and Proteaceae (43 taxa). The most commonly represented genera in the Warrington area are *Acacia* (25 taxa), *Stylidium* (16 taxa) *Hibbertia* (15 taxa) and *Lomandra* (15 taxa).

#### 4.6. Potential Threatened and Priority Flora

Four threatened flora species, pursuant to section 179 of the *EPBC Act* and as listed by DCCEEW (2023a) or pursuant to Part 2, Division 1 and Subdivision 2 of the *BC Act* and as listed by DBCA (2022a) have the potential to occur in the Warrington survey area (Appendix C). Three of these species are listed Vulnerable with one listed Critically Endangered. Of these four species, only *Morelotia australiensis* has the potential to occur in the survey area. The other species are either restricted to the Darling Scarp (west of the survey area) or

A total of fourteen priority flora species, including two Priority 1, three Priority 2, six Priority 3 and three Priority 4 have the potential to occur within the Warrington survey based on desktop assessment (Appendices B and C, Figure 8). 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 Warrington survey area.

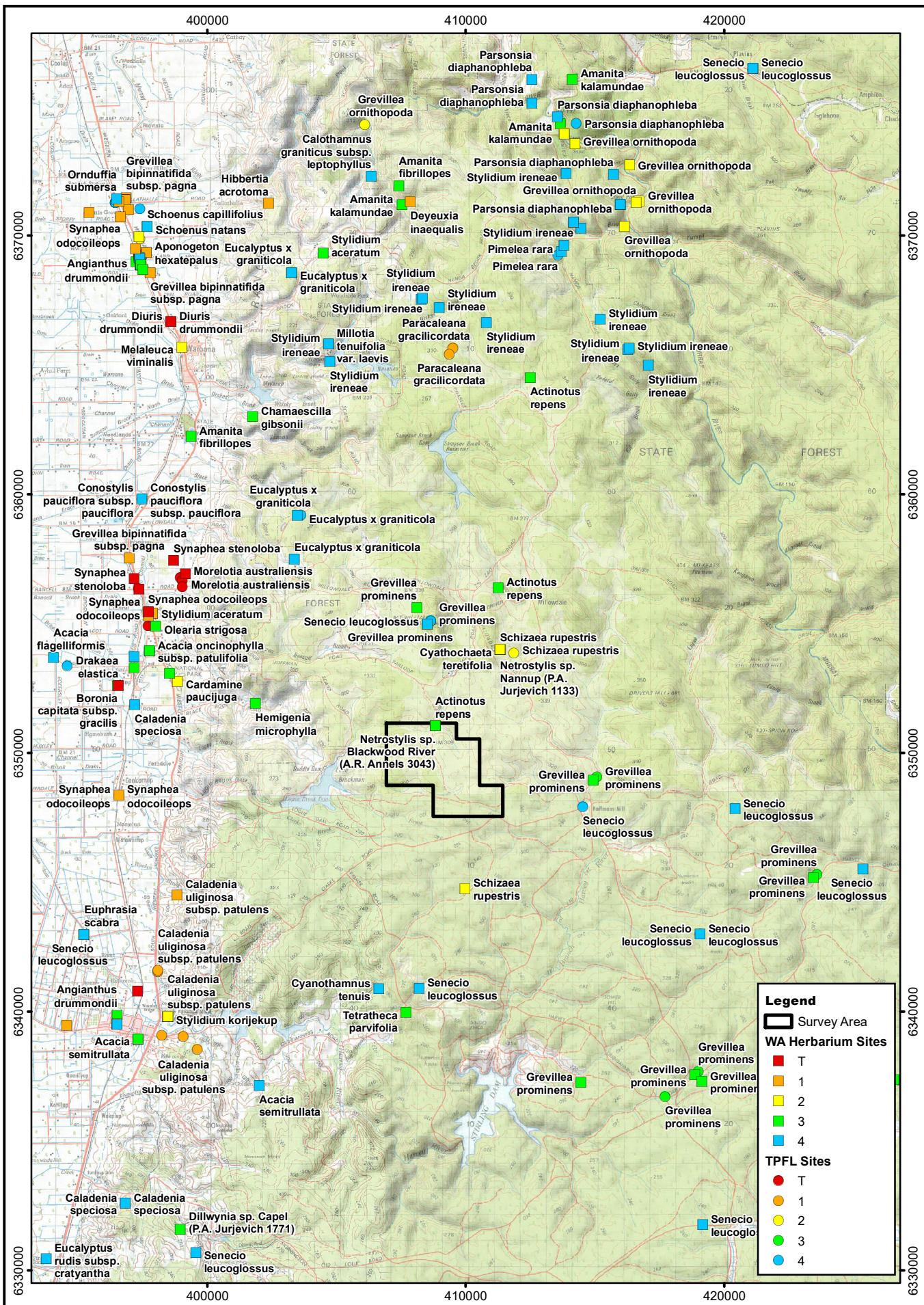
An assessment of the likelihood of recording any of the listed threatened and priority taxa within the survey area, based on factors including known soil type, topography and distribution including state records, is set out in Appendix C.

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 Low, Moderate or High. Records that have been documented either within or in close proximity of the survey area were ranked as Moderate or High.

Of the 14 Priority flora species, one Priority 1, two Priority 2, three Priority 3 and one Priority 4 flora species had a moderate to high likelihood of occurrence, mainly due to previous records in the area and suitable habitat (Appendix C). Of the four threatened taxa, the Vulnerable, *Morelotia australiensis* had a Moderate ranking based on results from the paid database searches.



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**Warrington Survey Area**  
**Threatened and Priority Flora**

Figure:  
**8**

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

A total of 48 introduced taxa may potentially exist in the wider Warrington survey area, based on NatureMap (DBCA 2007- ), the *EPBC Act* Protected Matters Search Tool (DCCEEW 2020b) search results (Appendix B) and records from Mattiske Consulting Pty Ltd.'s (2015-2022) surveys near Larego. Only one of the potential weeds *\*Rubus ulmifolius*, as listed under the *\*Rubus fruticosus* aggregate, is a Weed of National Significance (DAFF, 2023). It is also a declared pest/organism under the *Biosecurity and Agriculture Management Act 2007* (WA) (DPIRD 2023). In addition, *\*R. ulmifolius* is listed with a C3 Management Control and a Exempt Keeping category (refer to Appendix A3).

**Table 4: Ecological Impact and Invasiveness rankings for Introduced (Weed) Species in the Introduced weed species potentially occurring within the Warrington survey area**

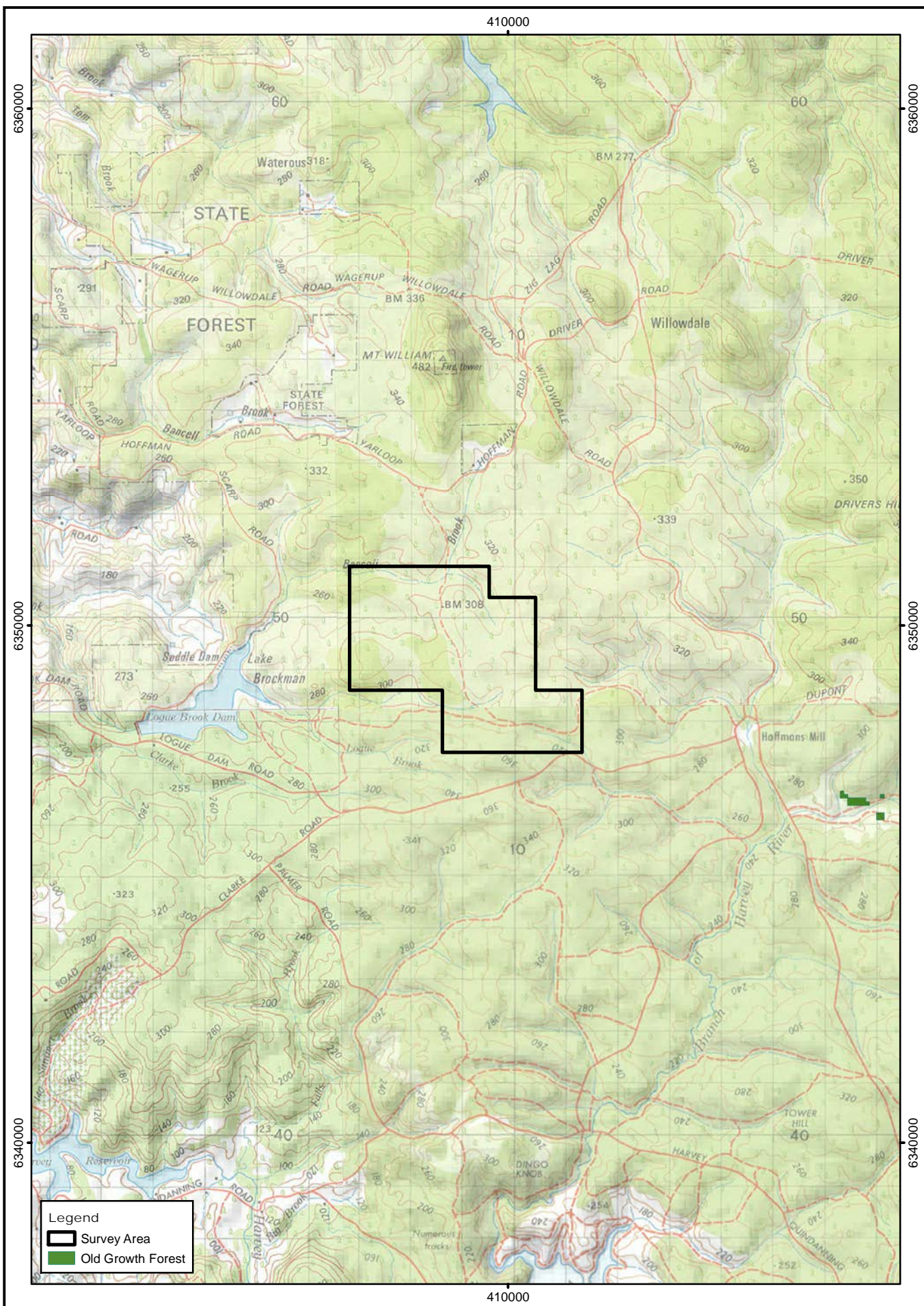
**Note:** <sup>1</sup>Department of Parks and Wildlife (DPAW 2014), <sup>2</sup>West Australian Organism List (DPIRD 2023), <sup>3</sup>Weeds of National Significance (DAFF 2023)

Species Name	DPAW <sup>1</sup>		WAOL <sup>2</sup>	Declared pest <sup>3</sup>
	Ecological Impact	Invasiveness Ranking		
<i>^Acacia pulchella</i>	-	-	Permitted - s11	-
<i>^Acacia pulchella var. pulchella</i>	-	-	Permitted - s11	-
<i>*Acacia pycnantha</i>	Low	Slow	Permitted - s11	-
<i>*Aira caryophyllea</i>	Unknown	Rapid	Permitted - s11	-
<i>*Babiana angustifolia</i>	High	Moderate	Permitted - s11	-
<i>*Briza maxima</i>	Unknown	Rapid	Permitted - s11	-
<i>*Callistemon citrinus</i>	-	-	Permitted - s11	-
<i>*Centaurium erythraea</i>	Unknown	Rapid	Permitted - s11	-
<i>*Chasmanthe floribunda</i>	High	Slow	Permitted - s11	-
<i>*Cotula coronopifolia</i>	Unknown	Rapid	Permitted - s11	-
<i>*Cyperus congestus</i>	Unknown	Moderate	Permitted - s11	-
<i>*Dischisma arenarium</i>	Unknown	Rapid	Permitted - s11	-
<i>*Erigeron sumatrensis</i>	Unknown	Rapid	Permitted - s11	-
<i>*Eucalyptus accedens</i>	-	-	Permitted - s11	-
<i>*Eucalyptus microcorys</i>	Unknown	Unknown	Permitted - s11	-
<i>*Eucalyptus saligna</i>	Unknown	Unknown	Permitted - s11	-
<i>*Galium murale</i>	Low	Unknown	Permitted - s11	-
<i>*Hypericum perforatum</i>	-	-	Permitted - s11	-
<i>*Hypochaeris glabra</i>	Moderate	Rapid	Permitted - s11	-
<i>*Lathyrus tingitanus</i>	Low	Slow	Permitted - s11	-
<i>^Lechenaultia biloba</i>	-	-	Permitted - s11	-

<i>*Lilium candidum</i>	-	-	Permitted - s11	-
<i>*Lonicera japonica</i>	Unknown	Slow	Permitted - s11	-
<i>*Lotus subbiflorus</i>	Unknown	Rapid	Permitted - s11	-
<i>*Lysimachia arvensis</i>	Unknown	Rapid	Permitted - s11	-
<i>*Medicago polymorpha</i>	-	-	Permitted - s11	-
<i>^Melia azedarach</i>	-	-	Permitted - s11	-
<i>*Orobanche minor</i>	Unknown	Rapid	Permitted - s11	-
<i>*Oxalis purpurea</i>	High	Slow	Permitted - s11	-
<i>*Oxalis sp.</i>	-	-	Permitted - s11	-
<i>*Phytolacca octandra</i>	Unknown	Moderate	Permitted - s11	-
<i>*Pinus pinaster</i>	Moderate	Rapid	Permitted - s11	-
<i>*Pinus sp.</i>	-	-	Permitted - s11	-
<i>*Polygala myrtifolia</i>	Moderate	Moderate	Permitted - s11	-
<i>*Quercus palustris</i>	-	-	Permitted - s11	-
<i>*Rubus ulmifolius</i>	High	Moderate	Declared Pest - s22(2)	Y
<i>*Senecio vulgaris</i>	Low	Moderate	Permitted - s11	-
<i>*Silene gallica</i>	Unknown	Rapid	Permitted - s11	-
<i>*Silene gallica var. gallica</i>	-	-	Permitted - s11	-
<i>*Sonchus oleraceus</i>	Moderate	Rapid	Permitted - s11	-
<i>*Stachys arvensis</i>	Unknown	Rapid	Permitted - s11	-
<i>*Syncarpia glomulifera</i>	-	-	Permitted - s11	-
<i>*Trifolium ligusticum</i>	Unknown	Unknown	Permitted - s11	-
<i>*Ursinia anthemoides</i>	Unknown	Rapid	Permitted - s11	-
<i>*Vellereophyton dealbatum</i>	Moderate	Rapid	Permitted - s11	-
<i>*Vinca major</i>	High	Slow	Permitted - s11	-
<i>*Wahlenbergia capensis</i>	Unknown	Rapid	Permitted - s11	-
<i>*Watsonia meriana var. meriana</i>	-	-	Permitted - s11	-

#### 4.8. Old-Growth Forests

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



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## Warrington Survey Area Old Growth Forest

Figure:  
**9**

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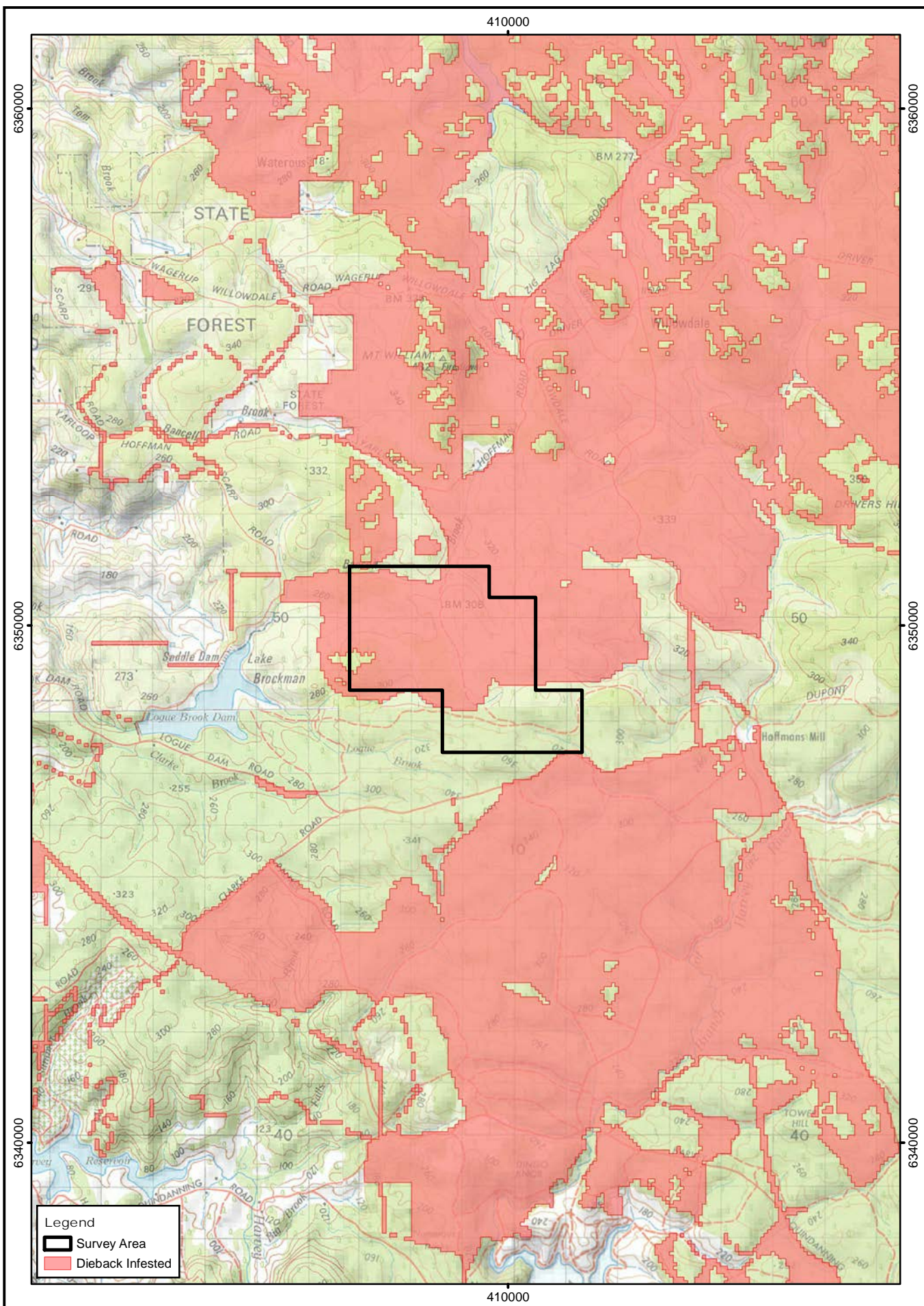
#### 4.9. Groundwater Dependant Ecosystems

The potential groundwater dependent ecosystems were determined on the basis of the extent of the vegetation complexes such as the Yarragil 1 and Yarragil 2 that occur within the Warrington survey area. 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*, *Hakea varia*, *Acacia divergens*, *Boronia molloyae*, *Thomasia paniculata*, *Astartea scoparia*, *Babingtonia camphorosmae*, *Eucalyptus rudis*, *Hypocalymma angustifolium*, *Hypocalymma cordifolium*, *Melaleuca preissiana*, *Melaleuca lateritia*, *Melaleuca viminea* and *Taxandria linearifolia*.

#### 4.10. Dieback

The extent of dieback from datasets supplied by the Department Biodiversity, Conservation and Attractions highlights the extent within the Warrington survey area and adjacent forest areas, Figure 12.



**Legend**

- Survey Area
- Dieback Infested

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**Warrington Survey Area**  
**Dieback**

Figure:  
10

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#### **4.11. Previous Surveys**

Over the past forty years, Mattiske Consulting has previously mapped the vegetation associated with Willowdale (including previous Larego areas; Mattiske Consulting Pty Ltd (2015, 2019, 2020, 2022)). These areas are in close vicinity to the Warrington survey area.

#### **4.12. Potential Threatened and Priority Ecological Communities**

No Threatened Ecological Communities (TECs) occur in the Warrington survey areas. The desktop assessment did highlight one community which may occur, *the Banksia Woodlands of the Swan Coastal Plain*; however this is restricted to the Swan Coastal Plain and as such does not extend into the Jarrah forest area on the Darling Ranges.

#### **4.13. 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 DCCEE (2023a) occur within the Warrington survey area. The closest wetlands of international importance is the Peel- Yalgorup system.

## 5. FIELD STUDIES FINDINGS

The following text summarizes the key findings from recent studies in 2023 within the Warrington survey area; which includes recording sites for vegetation mapping and opportunistic and targeted assessments.

### 5.1. Survey Effort

The survey efforts has been undertaken over a decade from multiple studies within the Willowdale and Larego areas. The major effort in 2023 which when combined with the depth of previous studies in adjacent areas for both Alcoa and also other clients leads to the conclusion that the work exceeds the current EPA Guidance Statement (2016a and 2016b) expectations for flora and vegetation studies.

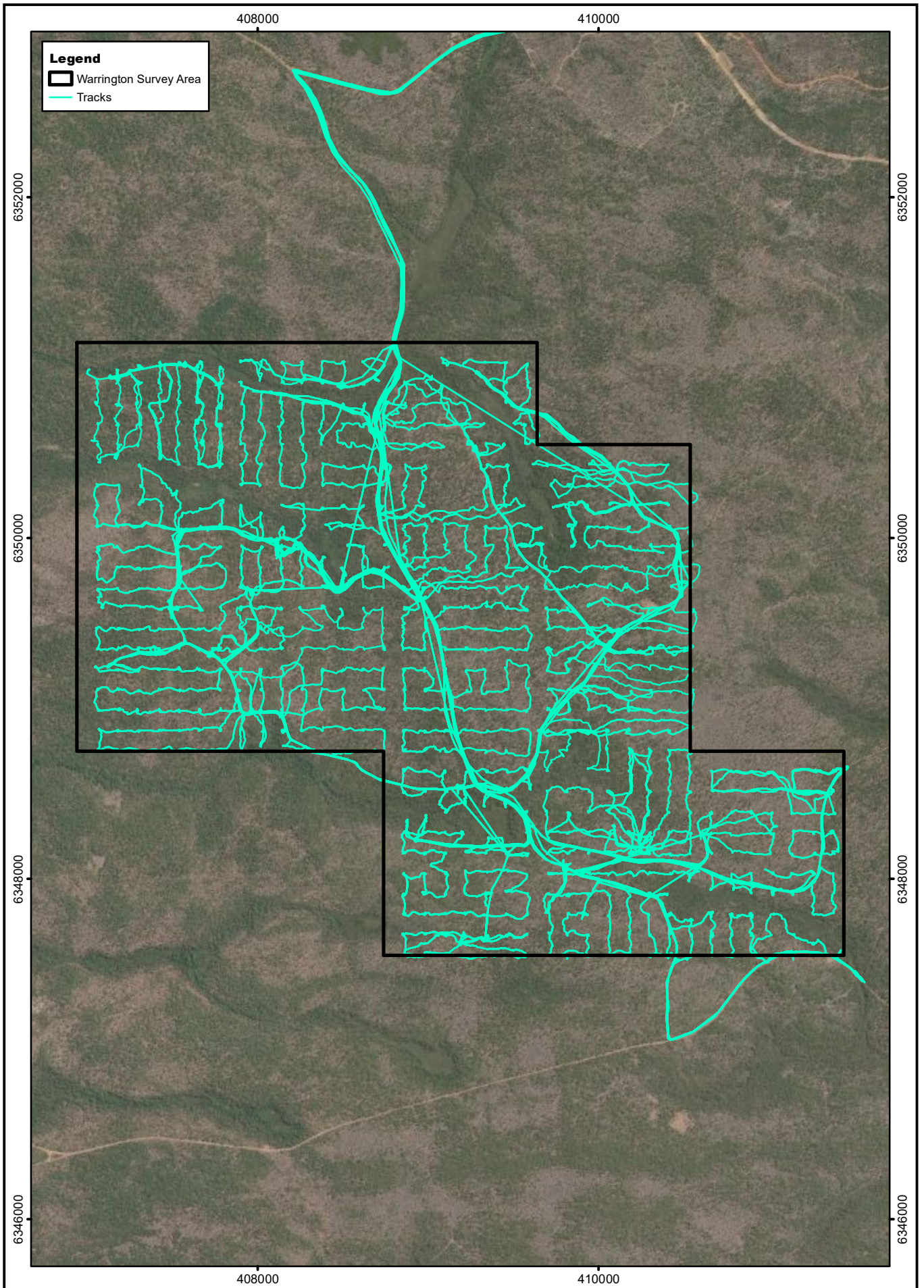
The survey effort to date has included (See Figure 11):

- . More than 100 kilometres of foot transects which includes the mapping efforts and targeted searches;
- . 772 recording sites in 2023 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 for both Alcoa and other clients in nearby areas;
- . targeted searches of additional extreme sites that are variable within the broader Yarragil vegetation complexes as well as the variable communities on the valley slopes and on the Dwellingup vegetation complex on the ridges in the Warrington survey areas. The coverage of the flora on the 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 Alcoa leases 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).

A general assessment was made of the current survey against a range of factors that may have limited the outcomes and conclusions of this report (Table 4).

**Table 4: Potential flora and vegetation survey limitations for the Warrington survey areas**

Potential Survey Limitation	Impact on Survey
Sources of information and availability of contextual information ( <i>i.e.</i> pre-existing background versus new material)	<b>Not a constraint:</b> Reference resources such as mapping by Beard (1979), Mattiske and Havel (1998), previous vegetation mapping completed for Alcoa 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>i.e.</i> what life forms, <i>etc.</i> , were sampled)	<b>Not a constraint:</b> 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.
Proportion of flora collected and identified (based on sampling, timing and intensity)	<b>Not a constraint:</b> The survey areas near Willowdale and Larego areas have been sampled over multiple years, with the more recent work on the detailed records on the grid system and targeted searches between sites. The recent survey effort in the majority of the areas was undertaken in the winter months 2023 (June, July and August). 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	<b>Not a constraint:</b> The vegetation was mainly assessed on a 120m x 120m grid pattern within the survey area. Over 100 kilometres were surveyed within the survey area. This together with 772 recording sites and the targeted and opportunistic survey sites (particularly near the granites and swamp areas) enabled intensive coverage of the values on the Warrington 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	<b>Minor constraint:</b> The EPA (2016a) recommends that flora and vegetation surveys in the South – West Botanical Province be conducted in Spring (September-November). The intensive work undertaken in sections of Larego has enabled coverage of different seasons. The detailed survey work commenced in June 2023 and was completed in August 2023. In view of extensive work in the areas adjacent to the survey areas this is considered to be only a minor constraint.
Disturbances (fire flood, accidental human intervention, <i>etc.</i> )	<b>Not a constraint:</b> With the exception of previous logging activities, an intense recent fire and occasional old forestry tracks, the vegetation of the survey area is largely undisturbed. A recent intense fire led to denser stands of <i>Bossiaea aquifolium</i> and as a result at time it was difficult to assess all stumps with a 20m radius. 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>i.e.</i> ability to access survey area)	<b>Not a constraint:</b> Vehicle access through the Warrington survey areas was only restricted in small sections.
Experience levels ( <i>e.g.</i> degree of expertise in plant identification to taxon level)	<b>Not a constraint:</b> All botanists had direct and recent experience working in the Jarrah Forest and working for Alcoa 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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## Warrington Survey Area Tracks

## 5.2. Flora

The survey efforts were undertaken over several months and in view of the extensive work undertaken over multiple decades in the Willowdale and Larego areas was considered to exceed the EPA (2016a and 2016b) guidance statements expectations.

A total of 238 taxa from 45 families and 111 genera was recorded in the Warrington survey area and as such partly reflects the smaller survey area when compared with the total from previous surveys that have been undertaken over the last few decades.

The range of flora collected on the Warrington and nearby Larego survey areas is summarized in Table 5 and Appendix B. As the survey efforts were undertaken over multiple years and also seasons the coverage of the flora was considered to exceed the EPA (2016a and 2016b) guidance statements expectations. 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 broad valley systems, slopes and ridges was considered to be comprehensive.

**Table 5: Summary of Flora Species on the Warrington and nearby Larego survey areas (see Appendix B)**

Source	Families	Genera	Native Taxa	Introduced Taxa
Larego Survey areas 2022	43	111	238	4
Nature Map and Additional Potential and recorded Species (see Appendix B)	79	214	578	4545

The summary of results from the plots and the recording sites as summarized by the site-vegetation types reflects this shift from species in the lateritic slopes and ridges and the broader valleys (see Appendix E).

## 5.3. Introduced Flora Species

Of the 238 species, 5 were introduced or planted species (*\*Pinus* sp.), Appendices B and D. The introduced species all occur more widely in the Jarrah forest and are not listed as WONS weeds at the National scale or as Declared pests at the State level.

## 5.4. Threatened and Priority Flora

No Threatened flora species, pursuant to section 179 of the *EPBC Act* and as listed by DCCEEW (2022a) or pursuant to Part 2, Division 1 and Subdivision 2 of the *BC Act* and as listed by DBCA (2022a) were recorded during recent assessments of the Warrington survey areas.

Two Priority flora species as listed by DBCA (2022a) have been recorded in the Warrington and nearby Larego survey areas (Appendix B), Table 6 and Figure 12.

**Table 6: Summary of Priority Flora recorded in Warrington survey areas**

SPECIES	Federal Conservation Status	State Conservation Status	Site-vegetation Types	Population
<i>Grevillea prominens</i>	-	P3	S and ST	Ranged from 2 to 5 plants on 3 sites
<i>Senecio leucoglossus</i>	-	P4	T	2

*Grevillea prominens* (P3) is known from 10 records at the State Herbarium (DBCA 2007-) and has been recorded east and south-east of the Warrington survey area and was recorded on lateritic gravelly soils. This species has been recorded in the wider Jarrah forest (DBCA 2007-).

*Senecio leucoglossus* (P4) is known from 45 records at the State Herbarium (DBCA 2007-) and is generally on the granite and lateritic slopes and ridges. This species has been recorded regularly in the northern Jarrah forest by the Mattiske teams over some four decades.

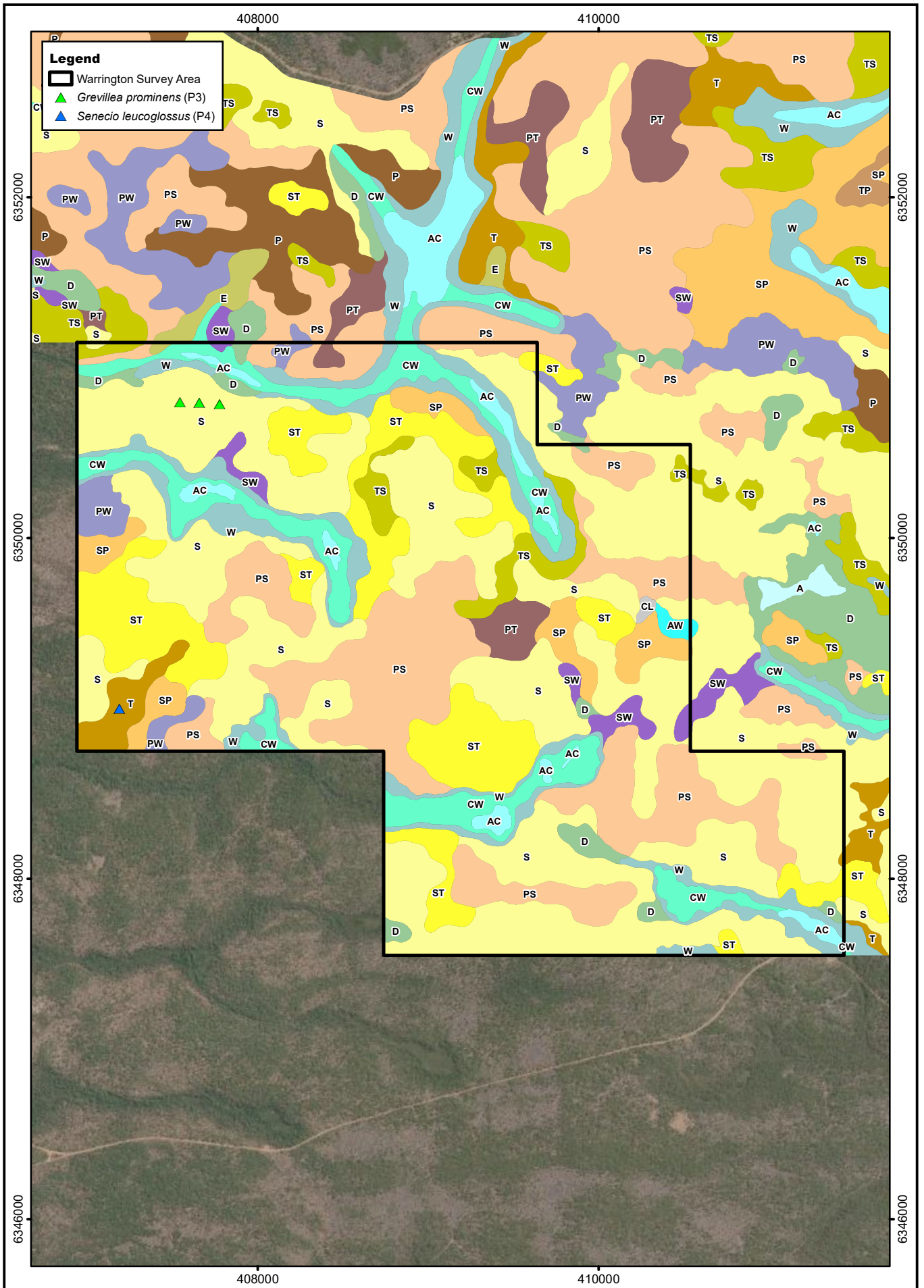
### 5.5. Site-vegetation Types

A total of 15 site-vegetation types were defined and mapped in the Warrington survey area, Table 7 and Figure 12. The site-vegetation types were subdivided into three main groupings associated with site conditions which reflected landforms, soils and soil moisture levels, Table 7. The site-vegetation types on the extreme sites such as broad valley systems 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 Warrington survey area. In addition the ranking of species and condition of species in the field has increased the intensity and coverage of the sites within the Warrington survey areas.

The dominant site-vegetation types were PS, PT, SP, S, ST, T and TS (79.63%) on the slopes and ridges and D, E, W, SW and PW on the moister slopes (11.34%). The more extreme sites associated with swamps and creeklines (types AC, AW and CW) covered less than 8.94% of the areas, Table 7.

The series of site-vegetation types associated with the broader valley systems which dominate the Yarragil 1 and Yarragil 2 vegetation complexes as defined by Mattiske and Havel (1998) provide a spatial diversity that supports a range of species. The site-vegetation types associated with these broader valleys (AC, AW, D, PW and SW) and lower slopes have the potential to be groundwater dependent ecosystems.

The site-vegetation types of PW and SW reflect the moister soils that may influence the spread and intensification of *Phytophthora cinnamomi*. As indicated in the Dieback data from DBCA (Figure 10) it is evident that dieback has influenced the condition of the vegetation in the Warrington survey areas.



N  
 0 200 400 m  
 Scale: 1:30,000  
 MGA94 (Zone 50)  
 CAD Ref: a1992\_F022\_17  
 Date: September 2023 Rev: A A4


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**Warrington Survey Area  
 Site Vegetation Types  
 and Priority Flora Species**

Figure:  
**12**

**Table 7: Summary of Site-vegetation Types (SVT) on the Warrington survey areas**

SVT Code	Description	Area_Ha	% Total
<b>Swamps (AC, AW) and Creeklines (CW)</b>			
AC	Open Woodland of <i>Eucalyptus rudis</i> – <i>Melaleuca preissiana</i> - <i>Eucalyptus patens</i> - <i>Banksia littoralis</i> with dense <i>Melaleuca</i> species, <i>Taxandria linearifolia</i> and <i>Astartea scoparia</i> in understorey on broad swamps and water-courses.	17.71	1.56
AW	Low open woodland of <i>Eucalyptus patens</i> and <i>Melaleuca preissiana</i> over <i>Banksia littoralis</i> , <i>Hakea prostrata</i> and <i>Pericalymma ellipticum</i> over low shrubs and herbs on leached sands over sandy-gravel on lower slopes.	2.50	9.22
CW	Woodland to Open Forest of <i>Eucalyptus patens</i> – <i>Eucalyptus megacarpa</i> - <i>Corymbia calophylla</i> - <i>Banksia littoralis</i> with dense <i>Taxandria linearifolia</i> and <i>Astartea scoparia</i> in understorey on creek-lines and water-courses.	81.19	7.16
<b>Lower Slopes (D, E, W) and Moister Slopes (PW and SW)</b>			
D	Open Forest of <i>Eucalyptus marginata</i> - <i>Corymbia calophylla</i> – <i>Hakea prostrata</i> on lower slopes with mixed low understorey species, including <i>Babingtonia camphorosmae</i> and <i>Acacia extensa</i> on clay loams to gravelly clay-loams.	15.84	1.40
E	Open woodland of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i> over <i>Mesomelaena tetragona</i> , <i>Kingia australis</i> , <i>Leptospermum erubescens</i> and <i>Babingtonia camphorosmae</i> on sandy to sandy-loam soils on slopes.	0.73	0.06
W	Open Forest of <i>Eucalyptus megacarpa</i> - <i>Eucalyptus patens</i> – <i>Corymbia calophylla</i> on lower slopes with mixed low understorey species, including <i>Acacia extensa</i> and <i>Hypocalymma angustifolium</i> on seasonally moister sandy-loam gravelly soils.	84.38	7.44
PW	Open Forest of <i>Allocasuarina fraseriana</i> - <i>Eucalyptus marginata</i> - <i>Corymbia calophylla</i> with scattered understorey, including <i>Grevillea wilsonii</i> , <i>Adenanthos barbiger</i> , <i>Babingtonia camphorosmae</i> and <i>Hypocalymma angustifolium</i> on sandy gravels.	14.85	1.31
SW	Open Forest of <i>Eucalyptus marginata</i> - <i>Corymbia calophylla</i> – <i>Banksia grandis</i> with scattered understorey, including <i>Adenanthos barbiger</i> , <i>Hypocalymma angustifolium</i> and <i>Styphelia tenuiflora</i> on seasonally moister sandy-gravelly soils.	12.78	1.13
<b>Slopes and Upper Ridges ( PS, PT, S, SP, ST, TS, T)</b>			
PS	Open Forest of <i>Allocasuarina fraseriana</i> - <i>Eucalyptus marginata</i> - <i>Corymbia calophylla</i> - <i>Banksia grandis</i> with scattered understorey, including <i>Adenanthos barbiger</i> , <i>Leucopogon capitellatus</i> on gravels and sandy gravels.	210.78	18.59
PT	Open Forest of <i>Allocasuarina fraseriana</i> - <i>Eucalyptus marginata</i> - <i>Corymbia calophylla</i> - <i>Banksia grandis</i> with scattered understorey, including <i>Adenanthos barbiger</i> , <i>Leucopogon verticillatus</i> , <i>Pteridium esculentum</i> and <i>Bossiaea aquifolium</i> subsp. <i>aquifolium</i> on sandy-loam gravels.	12.86	1.13
S	Open Forest of <i>Eucalyptus marginata</i> - <i>Banksia grandis</i> – <i>Allocasuarina fraseriana</i> with scattered understorey, including <i>Adenanthos barbiger</i> , <i>Leucopogon capitellatus</i> and <i>Styphelia tenuiflora</i> on gravels and sandy-gravels.	452.90	39.94
SP	Open Forest of <i>Allocasuarina fraseriana</i> - <i>Eucalyptus marginata</i> - <i>Corymbia calophylla</i> - <i>Banksia grandis</i> with scattered understorey, including <i>Adenanthos barbiger</i> , <i>Grevillea wilsonii</i> and <i>Leucopogon capitellatus</i> on sandy-gravels to gravelly soils.	38.51	3.40
ST	Open Forest of <i>Eucalyptus marginata</i> - <i>Corymbia calophylla</i> with scattered understorey, including <i>Leucopogon capitellatus</i> , <i>Leucopogon verticillatus</i> , <i>Pteridium esculentum</i> , <i>Lasiopetalum floribundum</i> and <i>Styphelia tenuiflora</i> on sandy-gravelly soils.	145.93	12.87
TS	Open Forest of <i>Eucalyptus marginata</i> - <i>Corymbia calophylla</i> – <i>Banksia grandis</i> with scattered understorey, including <i>Leucopogon verticillatus</i> , <i>Pteridium esculentum</i> , <i>Clematis pubescens</i> and <i>Bossiaea aquifolium</i> subsp. <i>aquifolium</i> on sandy-loam gravelly to gravelly soils.	27.86	2.46
T	Open Forest of <i>Eucalyptus marginata</i> - <i>Corymbia calophylla</i> with scattered understorey, including <i>Leucopogon verticillatus</i> , <i>Pteridium esculentum</i> , <i>Clematis pubescens</i> and <i>Bossiaea aquifolium</i> subsp. <i>aquifolium</i> on sandy-loam gravelly soils.	14.03	1.24

## 5.6. Vegetation Condition

The majority of the vegetation was ranked as good to excellent despite historical harvesting activities, intense fires, dieback and some established tracks in the area. The presence of the dieback disease is particularly evident in the condition of the vegetation on the lower slopes that support D, SW and PW site-vegetation types.

### 5.7. Threatened and Priority Ecological Communities

No Threatened Ecological Communities (TECs) occur in the Warrington survey areas (DBCA 2022c). The desktop assessment highlighted several potential TECs; however these are restricted to the Swan Coastal Plain and as such do not extend into the Jarrah forest area on the Darling Ranges.

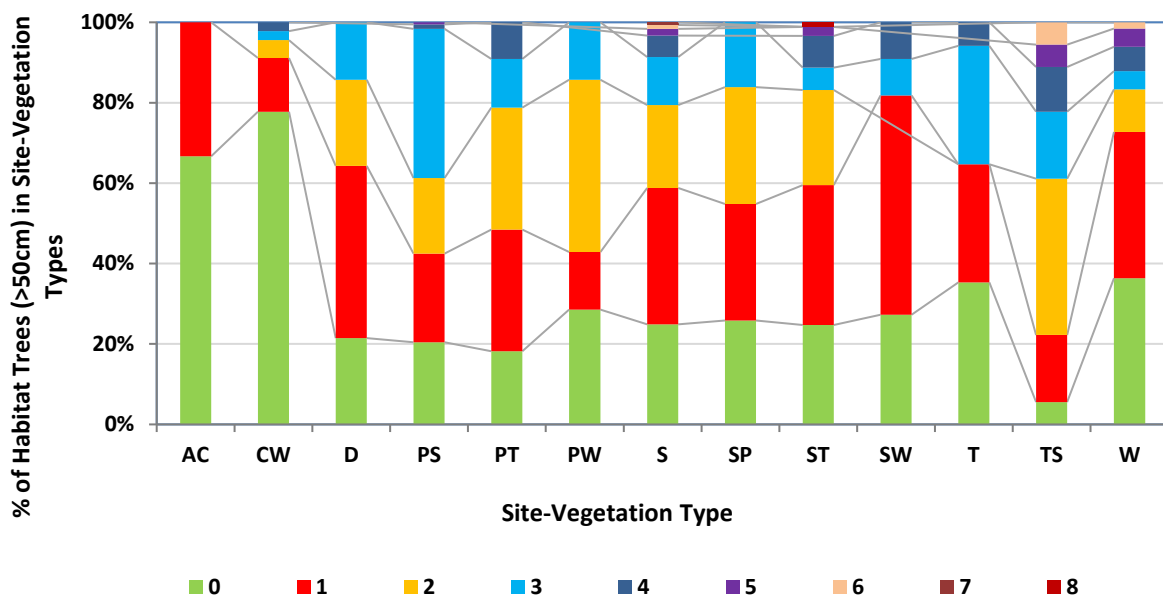
One of the priority ecological communities (PECs), as listed at State level by DBCA (2020d) occurs north and east of the Warrington survey areas on the granite areas near Jarrahdale and Boddington.

The Warrington survey areas occurs within the Regional Forest Agreement (RFA) area of the southwest forests DCCEEW (2022b) and as such was considered during the RFA process.

### 5.8. Old Growth Forests

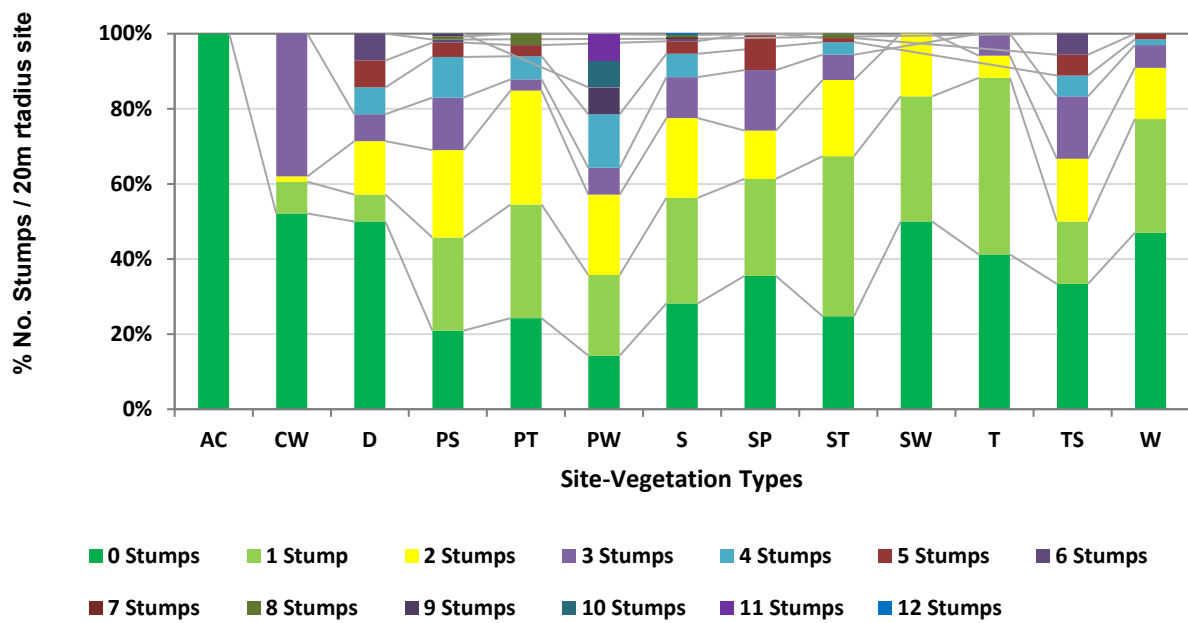
Based on data supplied by the Department of Biodiversity, Conservation and Attractions no areas have been highlighted within the Warrington survey areas. This is supported by the data collected on degree of logging, number of stumps. The counting of the number of stumps was at times restricted by the density of the *Bossiaea aquifolium* (that had resulted mainly from recent intense fires); however in view of the number of logs and harvesting activities this was not considered to influenced the overall interpretation.

On the basis of the number of potential habitat trees and number of stumps, there are some areas of Warrington that have some potential to reflect lower logging rates (Figures 13, 14 and 15). In reviewing the data as collected within the Warrington survey areas it is apparent that the swamp areas (AC and CW) supported few larger trees and the site-vegetation types (i.e. PS, PT, S, St, T, TS and W) supported proportionally higher number of larger potential habitat trees (Diameter at Breast Height (DBH) > 50cm).

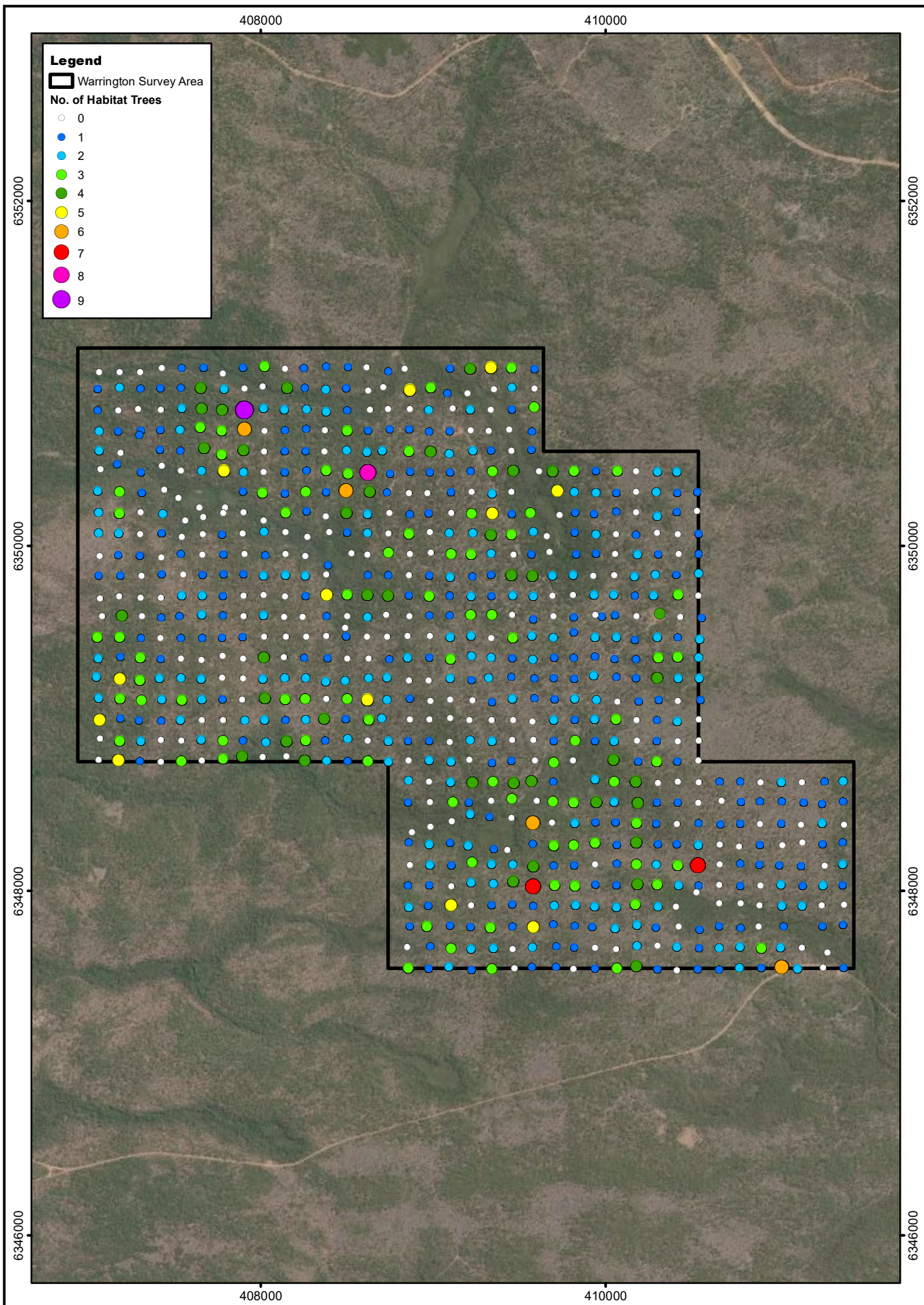


**Figure 13: Summary of Number of Potential Habitat Trees (>50cm DBH) in the respective Site-vegetation Types on the Warrington survey areas** (note AW and E site-vegetation types were restricted in area and formed extensions into current survey area from previous mapping)

The results in Figure 14 reflect the lower number of stumps from previous logging activities in the AC, CW, D and W site vegetation types associated with the creeklines, swamps and lower slopes.



**Figure 14: Summary of Number of Stumps per Site in the respective Site-vegetation Types on the Warrington survey areas** (note AW and E site-vegetation types were restricted in area and formed extensions into current survey area from previous mapping)



**Legend**

□ Warrington Survey Area

**No. of Habitat Trees**

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

N

0 190 380 m

Scale: 1:30,000  
MGA94 (Zone 50)

CAD Ref: a1992\_F022\_14  
Date: September 2023

Rev: A | A4

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**Warrington Survey Area  
Potential Habitat Trees**

Figure:  
**15**

## 6. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

### 6.1. Flora

The survey efforts were undertaken over 3 months in the winter months of 2023. The seasonal work in the Warrington and nearby survey areas in recent years was considered to exceed the EPA (2016a and 2016b) guidance statements expectations.

A total of 238 vascular plant taxa, representative of 111 genera and 45 families, were recorded in the Warrington survey area. A total of 5 introduced taxa (weeds and planted species) were recorded in the Warrington survey area. None of the weeds were Weeds of National Significance (DCCEEW, 2023) or declared pest/organism under the *Biosecurity and Agriculture Management Act 2007* (WA) (DPIRD 2023).

No listed threatened flora species were recorded in the Warrington survey areas. The latter largely relates to the occurrence of most of the potential species on either granite outcrops or on the eastern Swan Coastal Plain.

Only two Priority species (*Grevillea prominens* (P3) and *Senecio leucoglossus* (P4)) were recorded in the Warrington survey areas.

### 6.2. 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.

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 three vegetation complexes in the Warrington survey areas. None of these are restricted to the Warrington survey areas.

A total of 15 site-vegetation types were defined and mapped in the Warrington survey areas (with an addition cleared area (CL). The site-vegetation types were subdivided into three main groupings associated with site conditions which reflected landforms, soils and soil moisture levels, Table 7. The site-vegetation types on the extreme sites such as broad valley systems and swamps 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 Warrington survey areas. In addition the ranking of species

The dominant site-vegetation types were PS, PT, SP, S, ST, T and TS (79.63%) on the slopes and ridges and D, E, W, SW and PW on the moister slopes (11.34%). The more extreme sites associated with swamps and creeklines (types AC, AW and CW) covered less than 8.94% of the areas.

The series of site-vegetation types associated with the broader valley systems which dominate the Yarragil 1 and Yarragil 2 vegetation complexes as defined by Mattiske and Havel (1998) provide a spatial diversity that supports a range of species. The site-vegetation types associated with these broader valleys (AC, AW, D, PW and SW) and lower slopes have the potential to be groundwater dependent ecosystems.

The site-vegetation types of PW and SW reflect the moister soils that may influence the spread and intensification of *Phytophthora cinnamomi*. As indicated in the Dieback data from DBCA it is evident that dieback has influenced the condition of the vegetation in the Warrington survey areas.

### 6.3. Potential Groundwater Dependent Ecosystems

The potential groundwater dependent ecosystems were determined on the basis of the vegetation complexes. 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 swamps and lower slopes of the 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.

Key indicator plant species that are generally accepted as indicators of moister soils and, hence, potential groundwater dependent ecosystems include – *Banksia littoralis*, *Hakea varia*, *Thomasia paniculata*, *Astartea scoparia*, *Hypocalymma angustifolium*, *Hypocalymma cordifolium*, *Melaleuca preissiana*, *Melaleuca raphiophylla*, *Melaleuca lateritia*, *Melaleuca viminea*, and *Taxandria linearifolia*. These species occur mainly in the AC and CW and to a lesser degree in D, W, SW and PW site-vegetation types.

### 6.4. Threatened and Priority Ecological Communities

No Threatened Ecological Communities (TECs) occur in the Warrington survey areas (DBCA 2022c). The desktop assessment highlighted several potential TECs; however these are restricted to the Swan Coastal Plain and as such do not extend into the Jarrah forest area on the Darling Ranges.

One of the priority ecological communities (PECs), as listed at State level by DBCA (2022d) occurs north and east of the Warrington survey areas on the granite areas near Jarrahdale and Boddington.

The Warrington survey areas occur within the Regional Forest Agreement (RFA) area of the southwest forests DCCEEW (2022b) and as such was considered during the RFA process.

### 6.5. Old Growth Forests

Based on data supplied by the Department of Biodiversity, Conservation and Attractions no areas have been highlighted within the Warrington survey areas. This is supported by the data collected on degree of logging, number of stumps. The counting of the number of stumps was at times restricted by the density of the *Bossiaea aquifolium* (that had resulted mainly from recent intense fires); however in view of the number of logs and harvesting activities this was not considered to influence the overall interpretation.

On the basis of the number of potential habitat trees there are some areas of Warrington that have some potential to reflect lower logging rates.

## 7. ACKNOWLEDGEMENTS

The authors would like to thank Alcoa of Australia Ltd for their assistance with this project.

## 8. PERSONNEL

The following Mattiske Consulting Pty Ltd personnel were involved in this project:

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L Rowles	Experienced Botanist	Project Leader, Field Studies, Data Collation	FB62000020-4
A. Pereira	Experienced Botanist	Field Studies, Data Collation	FB62000145-2
D. Rubick	Botanist	Field Studies, Data Collation	FB62000328-2
A. Rowe	Botanist	Field Studies, Data Collation	FB62000329-2
L Ducki	Botanist	Field Studies, Data Collation	FB62000394
J. Wescombe	Botanist	Data collation, reporting	N/A
R. Jones	Botanist	Data collation and Assisting with Reporting	N/A

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## 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
<b>Ex</b>	<b>Extinct</b>	Species which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
<b>ExW</b>	<b>Extinct in the Wild</b>	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.
<b>CE</b>	<b>Critically Endangered</b>	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.
<b>E</b>	<b>Endangered</b>	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.
<b>V</b>	<b>Vulnerable</b>	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.
<b>CD</b>	<b>Conservation Dependent</b>	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	<b>Critically endangered</b>	Species considered to be facing an extremely high risk of becoming extinct in the wild (listed under Schedule 1 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> ).
EN	<b>Endangered</b>	Species considered to be facing a very high risk of becoming extinct in the wild (listed under Schedule 2 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> ).
VU	<b>Vulnerable</b>	Species considered to be facing a high risk of becoming extinct in the wild (listed under Schedule 3 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> ).

**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
<b>P1</b>	<b>Priority 1:</b> 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.
<b>P2</b>	<b>Priority 2:</b> 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.
<b>P3</b>	<b>Priority 3:</b> 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.
<b>P4</b>	<b>Priority 4:</b> Rare, Near Threatened, and other species in need of monitoring	<p><b>a) Rare</b> - 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.</p> <p><b>b) Near Threatened</b> - 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.</p> <p><b>c) Other</b> - Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>

## 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
<b>Critically Endangered</b>	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
<b>Endangered</b>	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.
<b>Vulnerable</b>	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	<b>Critically Endangered</b>	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 <b>any one or more of</b> the following criteria: <ol style="list-style-type: none"> <li>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;</li> <li>2. The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or</li> <li>3. The ecological community is highly modified with potential of being rehabilitated in the immediate future.</li> </ol>
EN	<b>Endangered</b>	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 <b>any one or more of</b> the following criteria: <ol style="list-style-type: none"> <li>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;</li> <li>2. The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or</li> <li>3. The ecological community is highly modified with potential of being rehabilitated in the short term future.</li> </ol>
VU	<b>Vulnerable</b>	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 <b>any one or more of</b> the following criteria: <ol style="list-style-type: none"> <li>1. The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated;</li> <li>2. The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution; or</li> <li>3. The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.</li> </ol>

**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	<b>Priority 1</b> (Poorly known ecological communities)	Ecological communities that are known from very few, restricted occurrences (generally $\leq 5$ occurrences or a total area of $\leq 100$ 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	<b>Priority 2</b> (Poorly known ecological communities)	Communities that are known from few small occurrences (generally $\leq 10$ occurrences or a total area of $\leq 200$ ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation.
P3	<b>Priority 3</b> (Poorly known ecological communities)	<ol style="list-style-type: none"> <li>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;</li> <li>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</li> <li>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.</li> </ol>
P4	<b>Priority 4</b> (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)	<ol style="list-style-type: none"> <li>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.</li> <li>Near Threatened – Communities considered to have been adequately surveyed and do not qualify for Conservation Dependent, but are close to qualifying for Vulnerable.</li> <li>Communities that have been removed from the list of threatened communities during the past five years.</li> </ol>
P5	<b>Priority 5</b> (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
<p style="text-align: center;"><b>C1 (Exclusion)</b></p> <p>'(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.'</p> <p>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.</p>	<p>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.</p>
<p style="text-align: center;"><b>C2 (Eradication)</b></p> <p>'(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.'</p> <p>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.</p>	<p>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.</p>
<p style="text-align: center;"><b>C3 (Management)</b></p> <p>'(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:</p> <p><b>(i)</b> alleviate the harmful impact of the declared pest in the area; or</p> <p><b>(ii)</b> reduce the number or distribution of the declared pest in the area; or</p> <p><b>(iii)</b> prevent or contain the spread of the declared pest in the area.'</p> <p>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.</p>	<p>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:</p> <p><b>(a)</b> alleviate the harmful impact of the declared pest in the area for which it is declared; or</p> <p><b>(b)</b> reduce the number or distribution of the declared pest in the area for which it is declared; or</p> <p><b>(c)</b> prevent or contain the spread of the declared pest in the area for which it is declared.</p>

## 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: SUMMARY OF VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR AND RECORDED IN THE WARRINGTON SURVEY AREA**

Note: \* denotes alien species; PL denotes planted species; PL\* denotes both planted/alien; and Mixed (^) refers to part native and part naturalised. T, P1 to P4 reflect Threatened and Priority species (DBCA, 2019a).  
 SCC = State Conservation Code; FCC= Federal Conservation Code; CE = Critically Endangered; E = Endangered;  
 V= Vulnerable. EPBC PMST (DCCEE, 2013), NatureMap (DBCA, 2007-), Previous MCPL (MCPL, 2015),  
 MCPL (MCPL, 2019), MCPL (MCPL, 2020), MCPL (2022), WAHerb and TPFL (DBCA, 38-0423FL, 2023).

Family	*	Species	SCC	FCC	EPBC PMST	NatureMap	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022	WAHerb	TPFL	MCPL 2023
Amaranthaceae		<i>Ptilotus manglesii</i>					x						
Anarthriaceae		<i>Lyginia</i> sp.					x						
Apiaceae		<i>Actinotus glomeratus</i>				x							
		<i>Actinotus leucocephalus</i>				x							
		<i>Actinotus repens</i>	P3			x					x		
		<i>Pentapeltis peltigera</i>				x	x	x	x	x			x
		<i>Pentapeltis silvatica</i>				x		x					
		<i>Platysace compressa</i>					x	x	x	x			x
		<i>Platysace filiformis</i>				x	x	x		x			x
		<i>Platysace tenuissima</i>											x
		<i>Platysace</i> sp.								x			x
		<i>Xanthosia atkinsoniana</i>				x	x		x	x			x
		<i>Xanthosia candida</i>				x	x	x	x	x			x
		<i>Xanthosia huegelii</i>				x	x	x		x			x
		<i>Xanthosia singuliflora</i>				x				x			x
		<i>Xanthosia tasmanica</i>				x							
		<i>Xanthosia ciliata</i>							x				
		<i>Xanthosia</i> sp.							x		x		x
		Apiaceae sp.											
Apocynaceae	*	<i>Vinca major</i>				x							
Araliaceae		<i>Hydrocotyle callicarpa</i>				x							
		<i>Trachymene pilosa</i>				x		x		x			x
Asparagaceae		<i>Laxmannia squarrosa</i>				x	x		x				x
		<i>Lomandra brittanii</i>						x		x			
		<i>Lomandra caespitosa</i>				x	x		x	x			x
		<i>Lomandra drummondii</i>											x
		<i>Lomandra hermaphrodita</i>				x	x		x	x			x
		<i>Lomandra integra</i>				x							
		<i>Lomandra micrantha</i>					x			x			x
		<i>Lomandra micrantha</i> subsp. <i>micrantha</i>				x	x			x			
		<i>Lomandra nigricans</i>				x	x		x	x			x
		<i>Lomandra pauciflora</i>				x							
	<i>Lomandra preissii</i>				x			x	x			x	
	<i>Lomandra purpurea</i>						x		x			x	

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Note: \* denotes alien species; PL denotes planted species; PL\* denotes both planted/alien; and Mixed (^) refers to part native and part naturalised. T, P1 to P4 reflect Threatened and Priority species (DBCA, 2019a).  
 SCC = State Conservation Code; FCC= Federal Conservation Code; CE = Critically Endangered; E = Endangered;  
 V= Vulnerable. EPBC PMST (DCCEEW, 2013), NatureMap (DBCA, 2007-), Previous MCPL (MCPL, 2015),  
 MCPL (MCPL, 2019), MCPL (MCPL, 2020), MCPL (2022), WAHerb and TPFL (DBCA, 38-0423FL, 2023).

Family	*	Species	SCC	FCC	EPBC PMST	NatureMap	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022	WAHerb	TPFL	MCPL 2023
Asparagaceae (continued)		<i>Lomandra sericea</i>				x	x	x	x	x			x
		<i>Lomandra sonderi</i>					x	x	x	x			x
		<i>Lomandra spartea</i>					x	x	x	x			x
		<i>Lomandra suaveolens</i>						x					
		<i>Lomandra sp.</i>					x	x	x	x			x
		<i>Thysanotus dichotomus</i>				x	x	x		x			
		<i>Thysanotus fastigiatus</i>				x		x		x			
		<i>Thysanotus manglesianus</i>						x					
		<i>Thysanotus multiflorus</i>				x	x	x	x	x			x
		<i>Thysanotus sparteus</i>											x
		<i>Thysanotus thyrsoideus</i>						x	x		x		x
		<i>Thysanotus sp.</i>						x					x
Asteraceae		<i>Cotula australis</i>				x							
	*	<i>Cotula coronopifolia</i>				x							
	*	<i>Erigeron sumatrensis</i>						x					
	*	<i>Erigeron sp.</i>											x
		<i>Hyalosperma cotula</i>								x			
	*	<i>Hypochaeris glabra</i>				x	x	x	x	x			x
		<i>Lagenophora huegelii</i>				x	x	x	x	x			x
		<i>Millotia tenuifolia</i>				x			x				
		<i>Olearia paucidentata</i>				x		x					
		<i>Olearia strigosa</i>									x		
		<i>Panaetia lessonii</i>				x							
		<i>Podolepis gracilis</i>				x							
		<i>Pseudognaphalium luteoalbum</i>											x
		<i>Pterochaeta paniculata</i>				x	x	x	x	x			x
		<i>Quinetia urvillei</i>				x							
		<i>Senecio diaschides</i>				x		x		x			x
		<i>Senecio hispidulus</i>					x		x	x			x
		<i>Senecio leucoglossus</i>	P4			x		x	x	x	x	x	x
		<i>Senecio multicaulis</i> subsp. <i>multicaulis</i>				x							
		<i>Senecio quadridentatus</i>						x	x	x			x
*	<i>Senecio vulgaris</i>								x				
	<i>Senecio sp.</i>				x	x	x	x	x			x	
*	<i>Sonchus oleraceus</i>								x				
	<i>Trichocline spathulata</i>				x	x	x	x	x			x	
*	<i>Ursinia anthemoides</i>						x						
*	<i>Vellereophyton dealbatum</i>						x						

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Note: \* denotes alien species; PL denotes planted species; PL\* denotes both planted/alien; and Mixed (^) refers to part native and part naturalised. T, P1 to P4 reflect Threatened and Priority species (DBCA, 2019a).  
 SCC = State Conservation Code; FCC= Federal Conservation Code; CE = Critically Endangered; E = Endangered;  
 V= Vulnerable. EPBC PMST (DCCEEW, 2013), NatureMap (DBCA, 2007-), Previous MCPL (MCPL, 2015),  
 MCPL (MCPL, 2019), MCPL (MCPL, 2020), MCPL (2022), WAHerb and TPFL (DBCA, 38-0423FL, 2023).

Family	*	Species	SCC	FCC	EPBC PMST	NatureMap	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022	WAHerb	TPFL	MCPL 2023
Asteraceae		<i>Xerochrysum macranthum</i>				x							
(continued)		Asteraceae sp.					x	x		x			x
Boryaceae		<i>Borya sphaerocephala</i>				x		x		x			x
Brassicaceae		<i>Cardamine paucijuga</i>	P2								x		
Campanulaceae		<i>Isotoma hypocrateriformis</i>				x				x			
		<i>Lobelia gibbosa</i>						x					
		<i>Lobelia</i> sp.							x	x			
		* <i>Wahlenbergia capensis</i>								x			
		<i>Wahlenbergia preissii</i>								x			
Caprifoliaceae	*	<i>Lonicera japonica</i>				x							
Caryophyllaceae	*	<i>Silene gallica</i>				x							
	*	<i>Silene gallica</i> var. <i>gallica</i>				x							
Casuarinaceae		<i>Allocasuarina fraseriana</i>				x	x	x	x	x			x
		<i>Allocasuarina</i> sp.						x					x
Celastraceae		<i>Stackhousia monogyna</i>					x	x		x			x
		<i>Stackhousia pubescens</i>				x							
		<i>Stackhousia</i> sp.				x	x	x					
		<i>Tripterococcus brunonis</i>								x			x
Centrolepidaceae		<i>Aphelia brizula</i>				x							
		<i>Centrolepis fascicularis</i>				x							
Colichicaceae		<i>Burchardia congesta</i>				x	x	x		x		x	
Crassulaceae		<i>Crassula exserta</i>				x							
		<i>Crassula</i> sp.				x							
Cupressaceae		<i>Callitris ?acuminata</i>					x						
Cyperaceae		<i>Cyathochaeta avenacea</i>				x	x	x		x			x
		<i>Cyathochaeta teretifolia</i>	P3			x	x				x		
	*	<i>Cyperus congestus</i>				x							

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Family	*	Species	SCC	FCC	EPBC PMST	NatureMap	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022	WAHerb	TPFL	MCPL 2023	
Cyperaceae (continued)		<i>Gahnia decomposita</i>				x	x	x	x	x			x	
		<i>Gahnia trifida</i>				x	x							
		<i>Lepidosperma apricola</i> sens. lat.					x							
		<i>Lepidosperma drummondii</i>				x								
		<i>Lepidosperma gracile</i>					x			x				
		<i>Lepidosperma leptostachyum</i>				x	x							
		<i>Lepidosperma longitudinale</i>				x								
		<i>Lepidosperma pubisquamum</i>				x	x			x			x	
		<i>Lepidosperma squamatum</i>				x	x	x	x	x			x	
		<i>Lepidosperma tenue</i>					x	x	x				x	
		<i>Lepidosperma tetraquetrum</i>				x	x	x	x	x			x	
		<i>Lepidosperma resinsum</i>					x							
		<i>Lepidosperma</i> sp.				x	x	x	x	x			x	
		<i>Machaerina articulata</i>					x							
		<i>Machaerina vaginalis</i>					x							
		<i>Mesomelaena graciliceps</i>					x							
		<i>Morelotia australiensis</i>	T		VU							x		
		<i>Morelotia octandra</i>					x	x	x	x				x
		<i>Morelotia</i> sp.					x							
		<i>Netrostylis</i> sp. Blackwood River (A.R. Annels 3043)	P3										x	
	<i>Netrostylis</i> sp. Jarrah Forest (R. Davis 7391)					x	x	x	x	x			x	
	<i>Netrostylis</i> sp. Nannup (P.A. Jurjevich 1133)	P1				x					x			
	Cyperaceae sp.						x	x	x	x			x	
Dasypogonaceae		<i>Kingia australis</i>					x	x					x	
Dennstaedtiaceae	*	<i>Histiopteris incisa</i>											x	
		<i>Pteridium esculentum</i>					x	x	x	x			x	
		<i>Pteridium esculentum</i> subsp. <i>esculentum</i>				x								
Dicranaceae		<i>Campylopus bicolor</i> var. <i>bicolor</i>				x								
Dilleniaceae		<i>Hibbertia acerosa</i>				x	x	x					x	
		<i>Hibbertia amplexicaulis</i>				x	x	x	x	x			x	
		<i>Hibbertia commutata</i>				x	x	x	x	x			x	
		<i>Hibbertia glomerata</i> subsp. <i>glomerata</i>									x			
		<i>Hibbertia hypericoides</i>					x	x	x	x			x	
		<i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>				x								
	<i>Hibbertia lasiopus</i>									x				

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Dilleniaceae (continued)		<i>Hibbertia ovata</i>					x	x	x				
		<i>Hibbertia perfoliata</i>					x	x	x				x
		<i>Hibbertia pilosa</i>				x							
		<i>Hibbertia serrata</i>				x	x						
		<i>Hibbertia silvestris</i>				x	x	x	x				
		<i>Hibbertia stellaris</i>				x							
		<i>Hibbertia subvaginata</i>							x	x			
		<i>Hibbertia</i> sp.					x	x		x			x
Droseraceae		<i>Drosera collina</i>				x							
		<i>Drosera erythrorhiza</i>					x	x					
		<i>Drosera leucoblasta</i>						x					
		<i>Drosera pallida</i>				x							
		<i>Drosera pulchella</i>				x							
		<i>Drosera squamosa</i>				x							
		<i>Drosera stolonifera</i>						x					
		<i>Drosera</i> sp.					x	x	x	x			x
Elaeocarpaceae		<i>Platytheca galioides</i>				x							
		<i>Tetratheca hirsuta</i>					x	x		x			x
		<i>Tetratheca hirsuta</i> subsp. <i>viminea</i>				x							
		<i>Tetratheca parvifolia</i>									x		
		<i>Tetratheca virgata</i>							x				
		<i>Tetratheca ?pilifera</i>	P3					x					
		<i>Tetratheca</i> sp.						x					x
Ericaceae		<i>Andersonia aristata</i>				x							
		<i>Andersonia latiflora</i>								x			x
		<i>Andersonia lehmanniana</i>				x							x
		<i>Andersonia</i> sp.					x	x					x
		<i>Astroloma</i> sp.					x	x					
		<i>Leucopogon australis</i>				x				x			x
		<i>Leucopogon capitellatus</i>				x	x	x	x	x			x
		<i>Leucopogon glabellus</i>								x			x
		<i>Leucopogon gracillimus</i>				x	x						
		<i>Leucopogon hirsutus</i>				x							
		<i>Leucopogon verticillatus</i>				x	x	x	x	x			x
	<i>Leucopogon</i> sp.					x	x		x				
	<i>Sphenotoma capitata</i>				x								

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Family	*	Species	SCC	FCC	EPBC PMST	NatureMap	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022	WAHerb	TPFL	MCPL 2023
Ericaceae (continued)		<i>Styphelia concinna</i>						x					
		<i>Styphelia discolor</i>				x	x	x	x				x
		<i>Styphelia nitens</i>				x	x	x	x	x			
		<i>Styphelia pallida</i>				x	x	x	x	x			x
		<i>Styphelia propinqua</i>				x	x	x	x	x			x
		<i>Styphelia tenuiflora</i>				x	x	x	x	x			x
		<i>Styphelia</i> sp.					x			x			x
Euphorbiaceae		<i>Amperea simulans</i>				x							x
		<i>Monotaxis grandiflora</i>						x					x
		<i>Monotaxis occidentalis</i>				x	x	x					
		<i>Ricinocarpos glaucus</i>				x							
		<i>Stachystemon vermicularis</i>								x			
Fabaceae		Euphorbiaceae sp.					x						
		<i>Acacia alata</i>						x		x			x
		<i>Acacia alata</i> var. <i>alata</i>				x	x		x				
		<i>Acacia applanata</i>											x
		<i>Acacia browniana</i>				x	x	x	x				x
		<i>Acacia browniana</i> var. <i>browniana</i>					x						
		<i>Acacia browniana</i> var. ? <i>endlicheri</i>											x
		<i>Acacia browniana</i> var. <i>obscura</i>					x						
		<i>Acacia celastrifolia</i>					x	x					x
		<i>Acacia decurrens</i>				x							
		<i>Acacia divergens</i>				x	x	x	x	x			x
		<i>Acacia drummondii</i> subsp. <i>candolleana</i>				x	x	x	x	x			x
		<i>Acacia drummondii</i> subsp. <i>drummondii</i>					x	x	x	x			x
		<i>Acacia extensa</i>				x	x	x	x	x			x
		<i>Acacia lateriticola</i>				x	x	x	x	x			x
		<i>Acacia myrtifolia</i>						x					
		<i>Acacia nervosa</i>				x	x	x	x	x			
		<i>Acacia oncinophylla</i> subsp. <i>patulifolia</i>									x		
		<i>Acacia preissiana</i>						x					
		<i>Acacia pulchella</i>				x	x	x	x	x			x
	<i>Acacia pulchella</i> var. <i>pulchella</i>				x								
	* <i>Acacia pycnantha</i>						x						
	<i>Acacia saligna</i>								x				
	<i>Acacia urophylla</i>				x		x	x	x			x	
	<i>Acacia varia</i> var. <i>crassinervis</i>				x								

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Family	*	Species	SCC	FCC	EPBC PMST	NatureMap	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022	WAHerb	TPFL	MCPL 2023
Fabaceae		<i>Acacia varia</i> var. <i>varia</i>				x		x					
(continued)		<i>Acacia willdenowiana</i>					x	x		x			
		<i>Acacia</i> sp.					x						x
		<i>Aotus procumbens</i>				x							
		<i>Bossiaea angustifolia</i>				x							
		<i>Bossiaea aquifolium</i>					x		x	x			x
		<i>Bossiaea aquifolium</i> subsp. <i>aquifolium</i>				x		x					
		<i>Bossiaea eriocarpa</i>											x
		<i>Bossiaea ornata</i>				x	x	x	x	x			x
		<i>Bossiaea spinescens</i>				x							
		<i>Callistachys lanceolata</i>				x	x						
		<i>Chorizema cordatum</i>				x		x	x	x			
		<i>Chorizema dicksonii</i>						x					
		<i>Chorizema rhombeum</i>				x							
		<i>Daviesia costata</i>				x							x
		<i>Daviesia cordata</i>						x					x
		<i>Daviesia decurrens</i>					x	x					
		<i>Daviesia preissii</i>						x					
		<i>Daviesia</i> sp.						x					
		<i>Eutaxia exilis</i>				x							
		<i>Gastrolobium glabratum</i>				x							
		<i>Gastrolobium</i> sp.								x			
		<i>Gompholobium capitatum</i>											x
		<i>Gompholobium knightianum</i>					x	x		x			
		<i>Gompholobium marginatum</i>					x	x		x			x
		<i>Gompholobium polymorphum</i>						x					x
		<i>Gompholobium preissii</i>				x		x		x			x
		<i>Gompholobium tomentosum</i>					x						
		<i>Gompholobium</i> sp.						x		x			
		<i>Hardenbergia comptoniana</i>											x
		<i>Hovea chorizemifolia</i>				x	x	x	x	x			x
		<i>Hovea trisperma</i>				x	x	x					x
		<i>Hovea</i> sp.								x			
		<i>Jacksonia alata</i>				x							
		<i>Jacksonia furcellata</i>						x					
		<i>Kennedia carinata</i>				x							
		<i>Kennedia coccinea</i>				x	x	x	x	x			x
		<i>Kennedia prostrata</i>				x		x		x			
		<i>Labichea punctata</i>					x	x	x	x			x

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Fabaceae (continued)	*	<i>Lathyrus tingitanus</i>				x								
	*	<i>Lotus subbiflorus</i>				x								
	*	<i>Medicago polymorpha</i>				x								
		<i>Mirbelia dilatata</i>				x	x	x	x	x			x	
		<i>Paraserianthes lophantha</i>						x	x	x			x	
		<i>Sphaerolobium linophyllum</i>											x	
		<i>Sphaerolobium medium</i>				x		x	x	x			x	
		<i>Sphaerolobium scabriusculum</i>				x								
		<i>Templetonia drummondii</i>						x						
		<i>Templetonia</i> sp.								x				
	*	<i>Trifolium arvense</i>												x
	*	<i>Trifolium ligusticum</i>					x							
		<i>Viminaria juncea</i>					x							
		Fabaceae sp.									x			
Fagaceae	*	<i>Quercus palustris</i>				x								
Gentianaceae	*	<i>Centaurium erythraea</i>				x				x				
Goodeniaceae		<i>Dampiera alata</i>				x							x	
		<i>Dampiera hederacea</i>				x		x					x	
		<i>Dampiera linearis</i>						x		x				
		<i>Dampiera</i> sp.											x	
		<i>Goodenia fasciculata</i>				x								
		<i>Lechenaultia biloba</i>				x	x	x	x	x			x	
		<i>Lechenaultia</i> sp.												
		<i>Scaevola calliptera</i>				x	x	x		x			x	
		<i>Scaevola pilosa</i>				x								
		<i>Scaevola</i> sp.						x						
		Goodeniaceae sp.									x			
Haemodoraceae		<i>Anigozanthos</i> sp.							x	x				
		<i>Conostylis juncea</i>				x								
		<i>Conostylis pusilla</i>						x		x			x	
		<i>Conostylis serrulata</i>				x	x	x	x	x			x	
		<i>Conostylis setigera</i>				x	x	x	x	x			x	
		<i>Conostylis setigera</i> subsp. <i>setigera</i>				x								
		<i>Conostylis setosa</i>						x	x	x			x	

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Haemodoraceae (continued)		<i>Conostylis</i> sp.						x	x				
		<i>Haemodorum laxum</i>								x			
		<i>Haemodorum</i> sp.					x	x		x			x
		<i>Tribonanthes violacea</i>				x							
		<i>Haemodoraceae</i> sp.						x					
Haloragaceae		<i>Glischrocaryon aureum</i>						x	x	x			
		<i>Gonocarpus benthamii</i>				x	x						
		<i>Gonocarpus diffusus</i>				x							
Hemerocallidaceae		<i>Agrostocrinum hirsutum</i>				x				x			x
		<i>Agrostocrinum scabrum</i>											x
		<i>Agrostocrinum</i> sp.				x							
		<i>Caesia micrantha</i>				x							
		<i>Chamaescilla corymbosa</i>					x	x	x	x			x
		<i>Chamaescilla corymbosa</i> var. <i>corymbosa</i>				x							
		<i>Chamaescilla</i> sp.					x						
		<i>Dianella revoluta</i>					x		x				x
		<i>Dianella revoluta</i> var. <i>divaricata</i>				x							
		<i>Johnsonia lupulina</i>				x	x			x			x
		<i>Stypandra glauca</i>				x	x						
		<i>Tricoryne elatior</i>				x							
		<i>Tricoryne</i> sp.											x
	<i>Hemerocallidaceae</i> sp.						x						
Hypericaceae	*	<i>Hypericum perforatum</i>				x							
Hypoxidaceae		<i>Pauridia gardneri</i>					x						
Iridaceae	*	<i>Babiana angustifolia</i>				x							
	*	<i>Chasmanthe floribunda</i>				x							
		<i>Orthrosanthus laxus</i>											x
		<i>Patersonia babianooides</i>								x			x
		<i>Patersonia juncea</i>						x					
		<i>Patersonia occidentalis</i>				x	x	x	x	x			x
		<i>Patersonia occidentalis</i> var. <i>occidentalis</i>				x							
		<i>Patersonia pygmaea</i>					x	x		x			x
		<i>Patersonia rudis</i>					x	x		x			x
	<i>Patersonia</i> sp.						x	x	x			x	

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Iridaceae	*	<i>Watsonia meriana</i> var. <i>meriana</i>				x							
(continued)		Iridaceae sp.								x			
Juncaceae		<i>Juncus holoschoenus</i>				x							
		<i>Juncus</i> sp.					x						
Juncaginaceae		<i>Cycnogeton lineare</i>				x							
		<i>Triglochin nana</i>				x							
Lamiaceae	*	<i>Stachys arvensis</i>				x							
		<i>Hemigenia humilis</i>											x
		<i>Hemigenia microphylla</i>	P3			x					x		
		<i>Hemigenia pritzelii</i>				x	x	x	x	x			x
		<i>Hemigenia</i> sp.											x
		<i>Lamiaceae</i> sp.						x					
Lauraceae		<i>Cassytha filiformis</i>							x				
		<i>Cassytha glabella</i>								x			
		<i>Cassytha glabella</i> forma <i>casuarinae</i>				x							
		<i>Cassytha pomiformis</i>				x							
		<i>Cassytha</i> sp.					x	x	x	x			
Liliaceae	*	<i>Lilium candidum</i>				x							
Lindsaeaceae		<i>Lindsaea linearis</i>				x	x	x		x			x
Loganiaceae		<i>Orianthera serpyllifolia</i> subsp. <i>angustifolia</i>				x							
Loranthaceae		<i>Nuytsia floribunda</i>					x						
Malvaceae		<i>Lasiopetalum floribundum</i>				x	x	x	x	x			x
		<i>Lasiopetalum glabratum</i>					x	x	x	x			
		<i>Lasiopetalum</i> sp.						x					
		<i>Thomasia</i> ? <i>macrocalyx</i>						x					
		<i>Thomasia paniculata</i>				x	x	x	x	x			x
		<i>Thomasia pauciflora</i>				x							
		<i>Thomasia</i> sp. Big Brook (M. Koch 2373)				x							
		<i>Thomasia</i> sp.					x		x				

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Family	*	Species	SCC	FCC	EPBC PMST	NatureMap	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022	WAHerb	TPFL	MCPL 2023
Meliaceae	PL	<i>Melia azedarach</i>				x							
Myrtaceae		<i>Astartea scoparia</i>				x	x	x	x	x			x
		<i>Babingtonia camphorosmae</i>					x	x	x	x			
	*	<i>Callistemon citrinus</i>				x							
		<i>Callistemon glaucus</i>							x				
		<i>Calothamnus</i> sp.						x		x			
		<i>Calytrix depressa</i>				x							
		<i>Calytrix leschenaultii</i>					x	x	x				
		<i>Calytrix</i> sp.					x	x	x	x			x
		<i>Corymbia calophylla</i>				x	x	x	x	x			x
		<i>Darwinia citriodora</i>				x	x						
	PL	<i>Eucalyptus accedens</i>						x					
		<i>Eucalyptus drummondii</i>						x					
		<i>Eucalyptus laeliae</i>				x							
		<i>Eucalyptus marginata</i>				x	x	x	x	x			x
		<i>Eucalyptus marginata</i> subsp. <i>marginata</i>				x							
		<i>Eucalyptus megacarpa</i>				x	x	x	x	x			x
	PL	<i>Eucalyptus microcorys</i>				x	x						
		<i>Eucalyptus patens</i>				x		x	x	x			x
		<i>Eucalyptus rudis</i>						x	x	x			x
	PL	<i>Eucalyptus saligna</i>				x							
		<i>Eucalyptus</i> x <i>graniticola</i>		P4		x						x	
		<i>Eucalyptus</i> sp.						x					x
		<i>Homalospermum firmum</i>					x	x					
		<i>Hypocalymma angustifolium</i>					x	x	x	x	x		x
		<i>Hypocalymma cordifolium</i>					x	x	x	x	x		x
		<i>Hypocalymma robustum</i>					x	x	x	x	x		
		<i>Hypocalymma</i> sp.						x	x				
		<i>Leptospermum erubescens</i>							x		x		
		<i>Melaleuca densa</i>					x						
		<i>Melaleuca huegelii</i> subsp. <i>huegelii</i>					x						
		<i>Melaleuca incana</i> subsp. <i>incana</i>					x						x
	<i>Melaleuca parviceps</i>						x					x	
	<i>Melaleuca preissiana</i>					x		x		x			
	<i>Melaleuca trichophylla</i>							x	x				
	<i>Melaleuca viminea</i> subsp. <i>viminea</i>					x						x	
	<i>Melaleuca</i> sp.							x					
	<i>Pericalymma ellipticum</i>						x	x	x	x		x	

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Myrtaceae (continued)	*	<i>Syncarpia glomulifera</i>				x							
		<i>Taxandria fragrans</i>				x							
		<i>Taxandria linearifolia</i>				x	x	x	x	x			x
		<i>Verticordia huegelii</i> var. <i>huegelii</i>				x							
		<i>Verticordia plumosa</i> var. <i>plumosa</i>				x	x						
		Myrtaceae sp.					x	x		x			x
Ophioglossaceae		<i>Ophioglossum lusitanicum</i>				x							
Orchidaceae		<i>Caladenia flava</i>					x						
		<i>Caladenia flava</i> subsp. <i>flava</i>				x							
		<i>Caladenia latifolia</i>								x			x
		<i>Caladenia nana</i> subsp. <i>nana</i>				x							
		<i>Caladenia reptans</i>								x			
		<i>Caladenia reptans</i> subsp. <i>reptans</i>											x
		<i>Caladenia speciosa</i>											
		<i>Caladenia uliginosa</i> subsp. <i>patulens</i>											
		<i>Caladenia</i> sp.					x			x			x
		<i>Cryptostylis ovata</i>				x	x		x	x			x
		<i>Cyrtostylis huegelii</i>											x
		<i>Diuris micrantha</i>	T	VU	x								
		<i>Diuris</i> sp.									x		x
		<i>Drakaea elastica</i>	T	CR								x	
		<i>Elythranthera brunonis</i>					x						
		<i>Eriochilus dilatatus</i> subsp. <i>dilatatus</i>					x						
		<i>Leporella</i> sp.						x					
		<i>Leptocerus menziesii</i>											
		<i>Microtis media</i>							x				
		<i>Microtis</i> sp.						x					
	<i>Prasophyllum brownii</i>					x							
	<i>Pterostylis crispula</i>											x	
	<i>Pterostylis pyramidalis</i>						x						
	<i>Pterostylis recurva</i>					x						x	
	<i>Pterostylis scabra</i>					x							
	<i>Pterostylis</i> sp. Bloated snail orchid (W. Jackson BJ 486)					x							
	<i>Pterostylis vittata</i>					x				x			
	<i>Pterostylis</i> sp.					x	x	x	x	x			
	<i>Pyrorchis nigricans</i>					x	x	x		x			
	<i>Thelymitra crinita</i>					x							

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Orchidaceae		<i>Thelymitra</i> sp.				x							
(continued)		Orchidaceae sp.					x	x	x	x			x
Orobanchaceae	*	<i>Orobanche minor</i>						x					
Oxalidaceae	*	<i>Oxalis purpurea</i>				x							
	*	<i>Oxalis</i> sp.						x					
Phyllanthaceae		<i>Lysiandra calycina</i>				x	x	x	x	x			x
Phytolaccaceae	*	<i>Phytolacca octandra</i>						x					
Pinaceae	PL	<i>Pinus pinaster</i>					x		x				
	PL	<i>Pinus</i> sp.				x	x						x
Pittosporaceae		<i>Billardiera floribunda</i>				x				x			
		<i>Billardiera fraseri</i>								x			
		<i>Billardiera fusiformis</i>					x	x	x	x			x
		<i>Billardiera variifolia</i>				x		x					
		<i>Billardiera</i> sp.						x					
		<i>Marianthus bicolor</i>							x				
		<i>Marianthus drummondianus</i>				x		x	x				x
		Pittosporaceae sp.					x			x			x
Plantaginaceae		<i>Gratiola pubescens</i>				x							
Poaceae	*	<i>Aira caryophyllea</i>								x			
		<i>Amphipogon amphipogonoides</i>						x		x			x
		<i>Amphipogon laguroides</i>				x		x					
		<i>Austrostipa</i> sp.						x					
	*	<i>Briza maxima</i>								x			
		<i>Dichelachne crinita</i>				x							
		<i>Eriachne</i> sp.							x				
		<i>Neurachne alopecuroidea</i>					x	x	x	x			x
		<i>Rytidosperma acerosum</i>								x			
		<i>Rytidosperma caespitosum</i>					x	x	x	x			x
		<i>Rytidosperma</i> sp.					x			x			
		<i>Tetrarrhena laevis</i>				x	x	x	x	x			x
		Poaceae sp.					x	x	x	x			x

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Family	*	Species	SCC	FCC	EPBC PMST	NatureMap	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022	WAHerb	TPFL	MCPL 2023
Podocarpaceae		<i>Podocarpus drouynianus</i>				x							
Polygalaceae		<i>Comesperma calymega</i>						x		x			x
		<i>Comesperma virgatum</i>				x	x	x		x			x
		<i>Comesperma</i> sp.					x						x
		* <i>Polygala myrtifolia</i>				x							
Primulaceae		* <i>Lysimachia arvensis</i>					x						
Proteaceae		<i>Adenanthos barbiger</i>				x	x	x	x	x			x
		<i>Adenanthos obovatus</i>				x	x						
		<i>Banksia dallanneyi</i> subsp. <i>dallanneyi</i>						x					x
		<i>Banksia dallanneyi</i> subsp. <i>dallanneyi</i> var. <i>dallanneyi</i>							x	x			
		<i>Banksia dallanneyi</i> subsp. <i>dallanneyi</i> var. <i>mellicula</i>				x							
		<i>Banksia dallanneyi</i> subsp. <i>sylvestris</i>				x			x	x			
		<i>Banksia grandis</i>				x	x	x	x	x			x
		<i>Banksia littoralis</i>					x	x	x	x			x
		<i>Banksia seminuda</i>				x			x				
		<i>Banksia sessilis</i>					x	x	x	x			x
		<i>Banksia sphaerocarpa</i>							x	x			
		<i>Banksia squarrosa</i> subsp. <i>squarrosa</i>						x					
		<i>Banksia</i> sp.							x	x			
		<i>Conospermum capitatum</i>											x
		<i>Conospermum capitatum</i> subsp. <i>glabratum</i>					x	x					
		<i>Conospermum flexuosum</i>					x						x
		<i>Conospermum flexuosum</i> subsp. <i>laevigatum</i>					x			x			
		<i>Conospermum stoechadis</i>								x			
		<i>Conospermum</i> sp.						x					x
		<i>Grevillea bipinnatifida</i>							x				x
	<i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>					x							
	<i>Grevillea diversifolia</i>						x		x				
	<i>Grevillea manglesii</i> subsp. <i>manglesii</i>						x						
	<i>Grevillea pilulifera</i>					x							
	<i>Grevillea prominens</i>	P3				x			x	x		x	
	<i>Grevillea pulchella</i>						x					x	
	<i>Grevillea pulchella</i> subsp. <i>ascendens</i>											x	
	<i>Grevillea quercifolia</i>					x	x						
	<i>Grevillea synapheae</i>					x							
	<i>Grevillea wilsonii</i>							x	x	x			x

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Family	*	Species	SCC	FCC	EPBC PMST	NatureMap	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022	WAHerb	TPFL	MCPL 2023
		<i>Hakea amplexicaulis</i>				x	x	x	x	x			x

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Family	*	Species	SCC	FCC	EPBC PMST	NatureMap	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022	WAHerb	TPFL	MCPL 2023
Proteaceae		<i>Hakea cyclocarpa</i>						x					x
(continued)		<i>Hakea incrassata</i>								x			
		<i>Hakea lasianthoides</i>				x			x				
		<i>Hakea lissocarpa</i>				x	x	x	x	x			x
		<i>Hakea prostrata</i>							x	x			x
		<i>Hakea ruscifolia</i>				x		x	x	x			x
		<i>Hakea varia</i>							x				
		<i>Isopogon sphaerocephalus</i>				x	x						
		<i>Persoonia elliptica</i>				x	x	x	x	x			x
		<i>Persoonia longifolia</i>				x	x	x	x	x			x
		<i>Synaphea gracillima</i>				x							
		<i>Synaphea odocoileops</i>	P1								x		
		<i>Synaphea petiolaris</i>				x	x						
		<i>Xylomelum occidentale</i>				x	x						x
Ranunculaceae		<i>Clematis pubescens</i>				x	x	x	x	x			x
Restionaceae		<i>Desmocladius fasciculatus</i>					x	x	x	x			x
		<i>Desmocladius flexuosus</i>					x	x	x	x			x
		<i>Hypolaena exsulca</i>				x	x	x	x	x			x
		<i>Leptocarpus coangustatus</i>				x							
		<i>Leptocarpus laxus</i>				x							
		<i>Leptocarpus roycei</i>				x							
		<i>Leptocarpus tenax</i>				x							
		<i>Lepyrodia curvescens</i>	P2					x					
		<i>Lepyrodia glauca</i>				x							
		<i>Lepyrodia macra</i>											x
		<i>Lepyrodia muirii</i>				x							
		<i>Loxocarya cinerea</i>				x				x			x
		<i>Loxocarya striata</i>					x						
		<i>Sporadanthus rivularis</i>				x	x						
		Restionaceae sp.					x			x			x
Rhamnaceae		<i>Trymalium ledifolium</i>				x	x	x	x	x			x
		<i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i>					x	x	x	x			
		<i>Trymalium odoratissimum</i> subsp. <i>trifidum</i>				x							
Rosaceae	*	<i>Rubus ulmifolius</i>						x					

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Rubiaceae	*	<i>Galium murale</i>				x							
		<i>Opercularia apiciflora</i>				x				x			x
		<i>Opercularia echinocephala</i>				x	x	x	x				x
		<i>Opercularia hispidula</i>				x				x			x
		<i>Opercularia vaginata</i>						x					
		<i>Opercularia sp.</i>						x		x			x
Rutaceae		<i>Asterolasia pallida</i>				x		x					
		<i>Boronia crenulata</i>				x	x			x			x
		<i>Boronia crenulata</i> subsp. <i>crenulata</i>							x				
		<i>Boronia crenulata</i> subsp. <i>crenulata</i> var. <i>crenulata</i>				x			x				
		<i>Boronia crenulata</i> subsp. <i>viminea</i>				x							
		<i>Boronia fastigiata</i>				x	x	x	x	x			x
		<i>Boronia molloyae</i>				x	x	x	x				x
		<i>Boronia scabra</i> subsp. <i>scabra</i>											x
		<i>Boronia sp.</i>						x					
		<i>Cyanothamnus tenuis</i>	P4			x					x		
		<i>Philotheca spicata</i>				x	x	x		x			x
Santalaceae		<i>Leptomeria cunninghamii</i>				x				x			x
Sapindaceae		<i>Dodonaea sp.</i>						x					x
Schizaeaceae		<i>Schizaea rupestris</i>	P2			x					x	x	
Scrophulariaceae	*	<i>Dischisma arenarium</i>				x							
Solanaceae		<i>Anthocercis gracilis</i>	T	VU	1								
Stylidiaceae		<i>Levenhookia pusilla</i>				x	x			x			x
		<i>Levenhookia stipitata</i>								x			x
		<i>Stylidium aceratum</i>											
		<i>Stylidium amoenum</i>				x	x	x	x	x			x
		<i>Stylidium androsaceum</i>				x							
		<i>Stylidium brunonianum</i>						x					
		<i>Stylidium bulbiferum</i>								x			x
		<i>Stylidium carnosum</i>				x							
		<i>Stylidium ciliatum</i>				x		x	x				
		<i>Stylidium crassifolium</i>				x							

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Stylidiaceae (continued)		<i>Stylidium despectum</i>				x							
		<i>Stylidium dichotomum</i>											x
		<i>Stylidium diuroides</i> subsp. <i>diuroides</i>				x							
		<i>Stylidium hispidum</i>				x				x			
		<i>Stylidium piliferum</i>					x	x	x	x			x
		<i>Stylidium repens</i>					x	x	x	x			x
		<i>Stylidium rhynchocarpum</i>				x							
		<i>Stylidium schoenoides</i>				x							
		<i>Stylidium</i> sp.					x	x	x	x			
Thymelaeaceae		<i>Pimelea ciliata</i>											x
		<i>Pimelea ciliata</i> subsp. <i>ciliata</i>				x							
		<i>Pimelea imbricata</i> var. <i>piligera</i>				x							
		<i>Pimelea lanata</i>				x							
		<i>Pimelea suaveolens</i>					x	x	x				x
		<i>Pimelea suaveolens</i> subsp. <i>suaveolens</i>				x							
		<i>Pimelea sylvestris</i>				x							
		<i>Pimelea</i> sp.					x	x	x	x			
Violaceae		<i>Pigea debilissima</i>				x							
		<i>Pigea floribunda</i>											x
Xanthorrhoeaceae		<i>Xanthorrhoea gracilis</i>				x	x	x	x	x			x
		<i>Xanthorrhoea preissii</i>				x	x	x	x	x			x
		<i>Xanthorrhoea</i> sp.						x		x			
Xyridaceae		<i>Xyris atrovirida</i>				x							
		<i>Xyris lacera</i>				x							
		<i>Xyris</i> sp.				x							
Zamiaceae		<i>Macrozamia riedlei</i>				x	x	x	x			x	

**APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE WARRINGTON SURVEY AREA**

**Note:** Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2022a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence												
<i>Anthocercis gracilis</i>	Solanaceae	T	Vulnerable	Habit: Erect, spindly shrub, to 0.6 (-1) m high. Flower colour: yellow-green Flowering period (indicated in green): <table border="1"><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Sandy or loamy soils. Granite outcrops. IBRA Distribution: AVW, JAF Florabase records: 29	J	F	M	A	M	J	J	A	S	O	N	D	Low Has not been recorded by DBCA or by MCPL previously within the survey area. Occurs mainly on the Darling Scarp and in the Wheatbelt.
J	F	M	A	M	J	J	A	S	O	N	D						
<i>Diuris micrantha</i>	Orchidaceae	T	Vulnerable	Habit: Tuberos, perennial, herb, 0.3-0.6 m high. Flower colour: yellow & brown Flowering period (indicated in green): <table border="1"><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Brown loamy clay. Winter-wet swamps, in shallow water. IBRA Distribution: JAF, SWA Florabase records: 9	J	F	M	A	M	J	J	A	S	O	N	D	Low Has not been recorded by DBCA or by MCPL previously within the survey area. Occurs mainly on the Darling Scarp and in the Wheatbelt.
J	F	M	A	M	J	J	A	S	O	N	D						
<i>Drakaea elastica</i>	Orchidaceae	T	CR	Habit: Tuberos, perennial, herb, 0.12-0.3 m high. Flower colour: red, yellow & green Flowering period (indicated in green): <table border="1"><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: White or grey sand. Low- lying situations adjoining winter-wet swamps. IBRA Distribution: SWA Florabase records: 18	J	F	M	A	M	J	J	A	S	O	N	D	Low One record listed in TPFL database as located within 10 km of survey area. Found adjacent to the SW Highway in dry sand. Occurs on the Swan Coastal Plain.
J	F	M	A	M	J	J	A	S	O	N	D						
<i>Morelotia australiensis</i>	Cyperaceae	T	VU	Habit: Perennial (short-lived) tufted herb, 0.3–1.3 m high. Flower colour: brown Flowering period (indicated in green): <table border="1"><tr><td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td></tr></table> Soils: Winter – wet swampy depressions, drainage lines or sandy rises. Grey sand over clay or yellow and sandy or clayey lateritic soils. IBRA Distribution: JAF, SWA Florabase records: 46	J	F	M	A	M	J	J	A	S	O	N	D	Moderate The WAHerb identified three records NE and within 10 km of survey area. Findings associated with lateritic gravel and clay loam.
J	F	M	A	M	J	J	A	S	O	N	D						

Commented [TM1]:

**APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE WARRINGTON SURVEY AREA**

**Note:** Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2022a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
<i>Netrostylis</i> sp. Nannup (P.A. Jurjevich 1133)	Cyperaceae	P1	-	Habit: Perennial. Caespitose sedge 90 cm high. Flower colour: - Flowering period (indicated in green): J F M A M J J A S O N D Soils: Creek, valley floors. IBRA Distribution: JAF Florabase records: 6	Moderate Locally abundant to the NW and within 5 km of survey area (WA Herb). Findings associated with clay loam and dark grey soils in lowland areas.
<i>Synaphea odocoileops</i>	Proteaceae	P1	-	Habit: Tufted, compact shrub, 0.2-0.5 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O N D Soils: Brown-orange loam; sandy clay, granite. Swamps, winter-wet areas. IBRA Distribution: SWA Florabase records: 22	Low WAHerb listing 0.5 km N of Yarloop. Found in swamp associated with black/grey sandy clay.
<i>Cardamine paucijuga</i>	Brassicaceae	P2	-	Habit: Slender erect annual herb to 0.4m high. Flower colour: White Flowering period (indicated in green): J F M A M J J A S O N D Soils: In moist to dry habitats IBRA Distribution: SWA, WAR, JAF Florabase records: 10	Very Low Occurs on Swan Coastal Plain and in Southern Wheatbelt
<i>Lepyrodia curvescens</i>	Restionaceae	P2	-	Habit: Dioecious, shortly creeping, tufted rhizomatous, herb, 0.24-0.4 m high, rhizomes on surface or to 1 cm deep. Flower colour: Light brown Flowering period (indicated in green): J F M A M J J A S O N D Soils: Sand, laterite. Seasonally inundated swampland. IBRA Distribution: GES, JAF, SWA Florabase records: 21	Moderate Recorded previously by MCPL (2019) near creekline approximately 5 km NE of Warrington survey area.

**APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE WARRINGTON SURVEY AREA**

**Note:** Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2022a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
<i>Schizaea rupestris</i>	Schizaeaceae	P2	-	Habit: Rhizomatous, perennial, herb or grass-like or (fern), 0.1-0.2m high. Flower colour: - Flowering period (indicated in green): J F M A M J J A S O N D Soils: Sand. Gullies, creek banks, shaded moist rock faces. IBRA Distribution: ESP, JAF, WAR Florabase records: 13	Moderate Two records identified by WA herb and one record contained in the TFPL database. All occurring within 5 km N and S of the survey area. Findings are associated with clay loam and dark gravelly soils.
<i>Actinotus repens</i>	Apiaceae	P3	-	Habit: Prostrate perennial to 5 cm high, c. 20cm wide. Flower colour: white Flowering period (indicated in green): J F M A M J J A S O N D Soils: Coarse black peaty sand over clay. Creeklines, edges of water channels. IBRA Distribution: JAF, WAR Florabase records: 36	Moderate- High One record within 1 km of Warrington central survey point. Located on the banks of a creekline containing <i>E. patens</i> , <i>E. megacarpa</i> , <i>T. linearifolia</i> , and <i>M. dilatata</i> .
<i>Cyathochaeta teretifolia</i>	Cyperaceae	P3	-	Habit: Rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2.0 m high, to 1.0 m wide. Flower colour: brown Flowering period (indicated in green): J F M A M J J A S O N D Soils: Grey sand, sandy clay. Swamps, creek edges. IBRA Distribution: JAF, SWA, WAR Florabase records: 40	Low Recorded previously by MCPL (2015).
<i>Grevillea prominens</i>	Proteaceae	P3	-	Habit: Spreading shrub, 0.5-1.7m high, 0.3-1m wide. Flower colour: cream-white Flowering period (indicated in green): J F M A M J J A S O N D Soils: Gravelly loam, along creeklines. IBRA Distribution: JAF Florabase records: 9	Moderate Recorded previously by MCPL (2022). Three records with WAHerb and within 10km of central Warrington survey point.

**APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE WARRINGTON SURVEY AREA**

**Note:** Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2022a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
<i>Hemigenia microphylla</i>	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: 25	Low DBCA and WAHerb records within 10 km of survey area.
<i>Netrostylis</i> sp. Blackwood River (A.R. Annelis 3043)	Cyperaceae	P3	-	Habit: Erect or spreading 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: Shallow grey sandy soil, clay loam. Along edges of creeklines and inundated swamp. IBRA Distribution: ESP, JAF, SWA, WAR Florabase records: 16	Moderate WAHerb lists one record within 1 km of central survey point and found within creekline.
<i>Tetratea pilifera</i>	Elaeocarpaceae	P3	-	Habit: Spreading shrub, 0.1-0.3 m high. Flower colour: purple Flowering period (indicated in green): J F M A M J J A S O N D Soils: Gravelly soils. IBRA Distribution: JAF, SWA Florabase records: 35	Low. MCPL (2019) recorded at one location and within 5 km of survey area on the slopes and ridges associated with the S site- vegetation type.
<i>Cyanothamnus tenuis</i>	Rutaceae	P4	-	Habit: Procumbent or erect & slender shrub, 0.1-0.5 m high. Flower colour: white-pink Flowering period (indicated in green): J F M A M J J A S O N D Soils: Laterite, stony soils, granite. IBRA Distribution: JAF, SWA Florabase records: 44	Low WAHerb lists one record of species found on granite rock and south of survey area.

**APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE WARRINGTON SURVEY AREA**

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
<i>Eucalyptus x graniticola</i>	Myrtaceae	P4	-	Habit: Mallee to 4 m, smooth bark. Flower colour: Stamens cream Flowering period (indicated in green): J F M A M J J A S O N D Soils: Granite soils. IBRA Distribution: JAF Florabase records: 6	Low WAHerb lists two records, both north of survey area and associated with granite.
<i>Senecio leucoglossus</i>	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	High Previously recorded by MCPL over multiple years.





**APPENDIX D: SUMMARY OF RECORDED SPECIES BY SITE-VEGETATION TYPES, WARRINGTON  
SURVEY AREAS, 2023**

\* denotes introduced species and P1 to P4 denotes Priority species

Species	AC	CW	W	D	SW	PW	PS	PT	S	SP	ST	T	TS
<i>Laxmannia</i> sp.									X				
<i>Laxmannia squarrosa</i>									X				
<i>Lechenaultia biloba</i>			X	X	X	X	X	X	X	X	X	X	X
<i>Lepidosperma ?pubisquameum</i>						X	X	X	X	X	X	X	X
<i>Lepidosperma</i> sp.		X	X	X		X	X	X	X	X	X	X	X
<i>Lepidosperma</i> sp. 1						X	X	X					
<i>Lepidosperma</i> sp. 2						X	X	X					
<i>Lepidosperma squamatum</i>		X				X	X	X	X	X			
<i>Lepidosperma tenue</i>			X						X		X		
<i>Lepidosperma tetraquetrum</i>	X	X							X				
<i>Leptocerus menziesii</i>							X				X		
<i>Leptomeria cunninghamii</i>				X			X		X				
<i>Lepyrodia macra</i>			X										
<i>Leucopogon australis</i>		X											
<i>Leucopogon capitellatus</i>			X	X				X	X	X	X		X
<i>Leucopogon glabellus</i>					X	X	X		X	X			
<i>Leucopogon verticillatus</i>			X		X		X	X	X	X	X	X	X
<i>Levenhookia pusilla</i>							X	X	X		X		
<i>Levenhookia stipitata</i>					X		X		X				
<i>Lindsaea linearis</i>		X	X										
<i>Lomandra caespitosa</i>		X	X	X	X	X	X	X	X	X	X	X	X
<i>Lomandra drummondii</i>						X	X	X	X	X	X		X
<i>Lomandra hermaphrodita</i>			X	X	X	X	X	X	X	X	X	X	X
<i>Lomandra micrantha</i>			X			X	X	X	X	X	X	X	X
<i>Lomandra nigricans</i>				X	X	X	X	X	X	X	X	X	X
<i>Lomandra preissii</i>							X		X	X	X	X	
<i>Lomandra purpurea</i>						X			X				
<i>Lomandra sericea</i>			X	X	X	X	X	X	X	X	X	X	X
<i>Lomandra sonderi</i>			X	X	X	X	X	X	X	X	X	X	X
<i>Lomandra</i> sp.		X	X	X	X		X	X	X	X	X	X	X
<i>Lomandra</i> sp. 1									X				
<i>Lomandra</i> sp. 2									X				
<i>Lomandra spartea</i>			X			X	X	X	X	X	X		
<i>Loxocarya cinerea</i>			X			X	X		X				
<i>Lysiandra calycina</i>		X	X	X	X	X	X	X	X	X	X	X	X
<i>Macrozamia riedlei</i>	X	X	X	X	X	X	X	X	X	X	X	X	X
Malvaceae sp.			X										
<i>Marianthus drummondianus</i>		X							X			X	
<i>Melaleuca incana</i> subsp. <i>incana</i>		X											
<i>Melaleuca parviceps</i>					X	X							
<i>Melaleuca viminea</i>	X	X											
<i>Mirbelia dilatata</i>	X	X	X	X		X	X		X	X	X	X	X
<i>Monotaxis occidentalis</i>			X						X		X		
<i>Morelotia octandra</i>			X		X		X		X		X		
Myrtaceae sp.					X				X	X			
<i>Netrostylis</i> sp. Jarrah Forest (R. Davis 7391)		X	X	X	X	X	X	X	X	X	X	X	X
<i>Neurachne alopecuroidea</i>							X		X				
<i>Opercularia apiciflora</i>			X		X		X		X		X	X	X
<i>Opercularia echinocephala</i>			X	X	X	X	X	X	X	X	X	X	X
<i>Opercularia hispidula</i>									X				
<i>Opercularia</i> sp.										X	X		
Orchidaceae sp.		X	X	X	X	X	X	X	X	X	X	X	X
Orchidaceae sp. 1			X	X			X		X	X	X		
Orchidaceae sp. 2			X	X			X		X	X	X		X
Orchidaceae sp. 3							X						
<i>Orthrosanthus laxus</i>									X		X		
<i>Paraserianthes lophantha</i>							X		X			X	
<i>Patersonia occidentalis</i>						X	X		X				
<i>Patersonia pygmaea</i>				X		X	X	X	X	X			
<i>Patersonia rudis</i>					X				X				
<i>Patersonia</i> sp.							X		X				
<i>Patersonia babianoides</i>							X	X	X	X	X	X	X

**APPENDIX D: SUMMARY OF RECORDED SPECIES BY SITE-VEGETATION TYPES, WARRINGTON SURVEY AREAS, 2023**

\* denotes introduced species and P1 to P4 denotes Priority species

Species	AC	CW	W	D	SW	PW	PS	PT	S	SP	ST	T	TS
<i>Pentapeltis peligera</i>		X	X	X	X		X	X	X		X		
<i>Pericalymma ellipticum</i>		X		X									
<i>Persoonia elliptica</i>						X			X		X	X	
<i>Persoonia longifolia</i>		X	X	X			X	X	X	X	X	X	X
<i>Philothea spicata</i>			X			X	X	X	X	X	X		
<i>Pimelea ciliata</i>			X										
<i>Pimelea sp.</i>			X				X						
<i>Pimelea suaveolens</i>			X	X	X	X		X	X				
Pittosporaceae sp.		X	X						X				
<i>Platysace compressa</i>		X	X	X			X	X	X	X	X	X	X
<i>Platysace filiformis</i>	X		X		X	X	X	X	X	X	X	X	X
<i>Platysace sp.</i>			X					X	X	X	X	X	X
<i>Platysace tenuissima</i>						X							
<i>Poaceae sp.</i>		X	X	X		X	X		X	X	X	X	X
<i>Pseudognaphalium luteoalbum</i>							X				X		
<i>Pteridium esculentum</i>	X	X	X	X	X		X	X	X		X	X	X
<i>Pterochaeta paniculata</i>				X		X	X	X	X	X			
<i>Pterostylis crispula</i>								X	X		X		
<i>Pterostylis sp.</i>	X	X	X	X	X		X	X	X	X	X	X	X
<i>Pterostylis sp. 1</i>												X	
<i>Pterostylis recurva</i>									X				
<i>Pyrorchis nigricans</i>							X		X		X	X	
Restionaceae sp.		X				X		X	X				X
<i>Rytidosperma caespitosum</i>		X	X	X	X	X	X	X	X	X	X		X
<i>Scaevola calliptera</i>			X				X	X	X	X	X	X	
<i>Senecio diaschides</i>					X			X	X				X
<i>Senecio hispidulus</i>			X	X			X	X	X	X	X	X	
<i>Senecio leucoglossus (P4)</i>												X	
<i>Senecio quadridentatis</i>									X				
<i>Senecio sp.</i>							X	X	X		X		
<i>Sphaerolobium linophyllum</i>								X	X				
<i>Sphaerolobium medium</i>							X	X	X				
<i>Stackhousia monogyna</i>			X	X	X	X	X		X	X	X		
<i>Stylidium amoenum</i>			X	X	X	X	X	X	X	X	X	X	X
<i>Stylidium bulbiferum</i>									X				
<i>Stylidium dichotomum</i>					X	X	X	X	X		X		
<i>Stylidium piliferum</i>			X			X	X	X	X	X	X		
<i>Stylidium repens</i>							X		X				
<i>Stylidium sp.</i>			X		X		X		X	X	X	X	
<i>Styphelia discolor</i>			X	X			X	X	X		X		
<i>Styphelia pallida</i>				X	X		X	X	X			X	
<i>Styphelia propinqua</i>			X	X	X	X	X		X	X	X	X	
<i>Styphelia sp.</i>									X				
<i>Styphelia tenuiflora</i>								X	X		X		
<i>Taxandria linearifolia</i>	X	X	X								X		
<i>Tetrarhena laevis</i>		X	X			X	X	X	X	X	X	X	X
<i>Tetratheca hirsuta</i>			X				X		X		X	X	
<i>Tetratheca sp.</i>			X										
<i>Thomasia paniculata</i>	X	X	X										
<i>Thysanotus sp.</i>							X		X		X		
<i>Thysanotus multiflorus</i>							X		X		X		
<i>Thysanotus sparteus</i>								X	X				
<i>Thysanotus thyrsoides</i>			X			X	X	X	X	X	X	X	
<i>Trachymene pilosa</i>							X		X	X	X	X	
<i>Trichocline spathulata</i>			X	X	X	X	X	X	X	X	X	X	X
<i>Tricoryne sp.</i>							X						
<i>Tripterococcus brunonis</i>				X			X		X	X			
<i>Trymalium ledifolium</i>		X	X	X	X	X	X	X	X	X	X	X	X
<i>Xanthorrhoea gracilis</i>			X	X	X	X	X	X	X	X	X	X	X
<i>Xanthorrhoea preissii</i>			X	X			X		X		X	X	X
<i>Xanthosia atkinsoniana</i>				X	X	X	X		X	X			
<i>Xanthosia candida</i>			X				X	X	X		X	X	X

