Appendix 79 Assessment of Flora and Vegetation Values - O'Neil, Huntly Mine, WA.

ASSESSMENT OF FLORA AND VEGETATION VALUES

ALCOA OF AUSTRALIA

ONEIL, HUNTLY MINE, WA

Prepared By

Mattiske Consulting Pty Ltd

Prepared For

Alcoa of Australia Limited

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TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

LIST OF ABBREVIATIONS

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

EXECUTIVE SUMMARY

Mattiske Consulting Pty Ltd was commissioned in 2023 by GHD on behalf of Alcoa of Australia Ltd (Alcoa) to conduct an assessment of the flora and vegetation values within the ONeil survey areas, approximately 60 km south east of Perth, WA. Initially this work entailed a review of past mapping in the area by Mattiske Consulting (2009, 2012) and an updated desktop assessment of the area. Field studies were then undertaken in the early part of 2024 to search for additional threatened and priority flora and to extend the previous site-vegetation type mapping. The ONeil survey area is located in tenement ML 1SA and as such overlaps current Alcoa operational areas and previous mapping areas.

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 ONeil 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 again in 2024 in line with some changes in nomenclature from 2022 to 2023.

The ONeil survey area lies 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.

Potential Flora

Based on the previous nearby surveys and the recent additional studies a total of 459 vascular plant taxa, representative of 168 genera and 59 families (Appendix B), have the potential to occur within the ONeil survey area (Mattiske Consulting 1998-2023). The most commonly represented families were Fabaceae (67 taxa), Proteaceae (53 taxa), Myrtaceae (38 taxa) and Asparagaceae (253 taxa).

A total of twelve threatened flora species and 37 priority flora species has the potential to occur in the ONeil survey area. Of the threatened flora species, all are considered to have a very low potential of occurring in the ONeil survey area due to the lack of suitable habitat and also know distributions away from the survey area.

In 2024, the data indicated that of the Priority flora species, six priority flora species have a high potential to be in the survey area and seven priority flora species have a moderate or moderate to high potential to be in the survey area.

On the basis of databases and previous surveys near or within the ONeil survey areas a total of 15 introduced taxa has the potential to occur in the ONeil survey area. None of the weeds are declared pest organisms pursuant to section 22 of the BAM Act (DPIRD 2024) and none are listed as Weeds of National Significance (DCCEEW 2024d).

Potential Vegetation Values

There are no TECs listed at Commonwealth or State level, or PECs listed at State level which would be likely to occur in the ONeil survey area; although further north the vegetation associated with granite outcrops has been classified as a PEC and further east and southeast the vegetation associated with granites has been classified as a PEC near Mt Saddleback (DBCA 2023b) .

The ONeil survey area occurs within the Regional Forest Agreement (RFA) area of the southwest forests DCCEEW (2024b) and as such was considered during the RFA process.

Based on data from Department of Biodiversity, Conservation and Attractions, there are no old growth forests occurring in the ONeil survey area; although several occur on the areas adjacent to the survey area. In view of the proximity of the survey areas to the well-established North-East Road it is extremely unlikely that there will be additional old growth forests in the survey area. The ONeil survey area has areas of dieback in the valley systems.

Survey Effort

The survey effort in the ONeil survey areas includes multiple survey efforts by Mattiske Consulting (2009, 2012) from the earlier flora and vegetation studies to the more recent targeted work and assessment of sites in a range of the site-vegetation types within the survey area that extend northwards and southwards from those areas previously mapped. This effort extends the flora and vegetation studies undertaken in the Northern Jarrah Forest over some 40 years. The survey efforts include results from 2008 and 2009 through to 2012 and more recently in 2023 and 2024 in the ONeil area and in adjacent areas. These studies have been supplemented by extensive detailed plot and transect studies in the Northern Jarrah Forest over 40 years, including permanent sampling sites within the current Oneil area which are intended to be re-assessed in the spring months of 2024 and where required additional plots will be established to include the range of flora and vegetation values in the ONeil area.

It is important to recognise that the vegetation mapping efforts in seasons outside of the spring months can still be undertaken as the vegetation mapping relies on perennial species which persist through the seasons. Further the perennial species persist through different seasons and the key indicators can be recognized throughout the year. The site-vegetation types extend the vegetation mapping over large areas of the Northern Jarrah Forest and as such integrate the flora, vegetation and site values which provides additional and critical information to the understanding of patterns in the area. The site-vegetation type approach was developed by Dr J Havel (1975a, 1975b) in close consultation with Dr D Goodall from CSIRO in the mid 1970's. Whilst this approach may differ from some other studies in Western Australia the development by Havel and Goodall was undertaken to define a series of key indicators and site conditions that would enable a finer definition of the northern Jarrah Forest communities. Such an approach enabled the subdivision of the main forest types which relied heavily on the structural components and the dominant trees. The latter broader approach is evident in the regional mapping at a coarser level as undertaken for the Pre-European vegetation mapping as undertaken by Beard 1979. The adoption of the site-vegetation type approach also enabled consideration of representation in the wider Northern Jarrah Forest and as such is supplemented by the vegetation studies during the System 6 (Heddle *et al*. 1980) and the Regional Forest Agreement investigations (Mattiske and Havel 1998) supported by state and federal government agencies.

In summary, the work undertaken to date on the Oneil survey area supplements extensive studies previously within and adjacent to the current survey area and as such meets the EPA (2016a and 2016b) guidelines. With the proposed supplementary flora and vegetation studies in the spring months of 2024 the effort exceeds the effort undertaken on many projects as it enables a detailed and comprehensive assessment of the survey area in the local and regional context.

Recorded Flora

In the more recent targeted flora and vegetation studies a total of 353 vascular plant taxa, representative of 143 genera and 61 families (Appendix C) were recorded in the ONeil survey area in 2024. If added to the recent work in the nearby areas between 2009 and 2024 this leads to a total of 536 vascular plant species from 182 genera and 66 families (Appendix C) for the wider area within and near this survey area. The dominant families were Proteaceae (51 taxa), Fabaceae (45 taxa), Myrtaceae (37 taxa), Asparagaceae (18 taxa), Dilleniaceae (16 taxa), Ericaceae (16 taxa), Cyperaceae (15 taxa) and Asteraceae (15 taxa). This higher number of species appeared to be related to the wider valleys with increasing variation in soil types and the increased occurrence of shallow soils associated with the granite outcrops.

No threatened flora as listed at the Federal and State level were recorded within the ONeil survey area in 2024 (DBCA 2023a and DCCEEW 2024a). A total of 4 priority flora species (*Hibbertia ?ambita* P1, *Hibbertia hortiorum* P1, *Grevillea dissectifolia* P3 and *Senecio leucoglossus* P4) were recorded in the ONeil survey area. The *Hibbertia hortiorum* and *Hibbertia ?ambita* occurrences appear to reflect the more easterly occurrence of these two species and in addition appears to reflect the more detailed studies of the *Hibbertia* genera by Kevin Thiele (2019). The *Grevillea dissectifolia* occurs mainly in the broader valley systems with some shallower soils and has been recorded previously to the north-east of the ONeil survey area. The *Senecio leucoglossus* occurs as scattered plants through the wider northern Jarrah forest and as such is not restricted to the ONeil area.

A total of 11 introduced species were recorded on the 2024 survey areas and some 20 species over the wider area. None of the weeds are declared pest organisms pursuant to section 22 of the BAM Act (DPIRD 2024) and none are listed as Weeds of National Significance (DCCEEW 2024d).

Recorded Vegetation

A total of 27 site-vegetation types were defined and mapped in the ONeil survey area and an additional two mapping units (CL cleared land and Rehabilitation areas). The site-vegetation types were defined on the basis of key species and site parameters as defined in Havel (1975a and 1975b) for the Jarrah forest and as refined and developed by Mattiske over the last 40 years. It is clearly apparent that there are some dominant site-vegetation types that dominate the ONeil survey area (namely P, PS, S, SP, ST, T and and TS which together cover 57.41% of the survey area). A total of some 11.17% of the survey area has been either cleared or rehabilitated within the ONeil survey area.

None of these site-vegetation types are restricted to the ONeil survey area; however all of the northern jarrah forest has not been mapped at this finer scale it is not feasible to provide a percentage representation of each site-vegetation type.

There are no threatened ecological communities (TECs) listed at Commonwealth level pursuant to sections 181 and 182 of the *EPBC Act* or listed by the DCCEEW (2024e) or at State level pursuant to Part 2 of the *BC Act* and as listed by DBCA (2024b) within the ONeil survey area.

There are no priority ecological communities (PECs), as listed at State level within the ONeil survey area. One of the difficulties faced in assessing the potential for PECs is that in many instances there is a lack of detailed data behind the delineation. In some sections of the Oneil area there are some of the values associated with the shallow soils of the granite outcrop areas that may have some values that overlap with the PEC as defined by DBCA 2023b for the outcrop areas to the north of the survey area and the outcrop areas near Mt Saddleback. As these areas occur on outcrop or shallow soil areas associated with outcrops it is unlikely that these areas would be disturbed. Further many of the values are represented in conservation areas to the (Monadnocks and to the east).

1. INTRODUCTION

Mattiske Consulting Pty Ltd (Mattiske) was commissioned by GHD on behalf of Alcoa of Australia Ltd (Alcoa) to conduct a desktop assessment and field assessment to evaluate the flora and vegetation values within the ONeil survey area, approximately 80 km south east of Perth, WA. Alcoa wishes to expand their mining operations into the ONeil survey area. The ONeil survey area is located in tenement ML1SA for Alcoa of Australia Ltd.

1.1. Location and Scope of Project

The ONeil survey area lies within the Northern Jarrah Forest subregion of the Southwest Botanical Province (Beard 1990), approximately 80 km south of Perth, WA (Figure 1). The ONeil survey area consists of one polygon located in tenement ML 1SA (Figure 2).

This report describes the potential and recorded flora and vegetation values of the proposed ONeil 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).

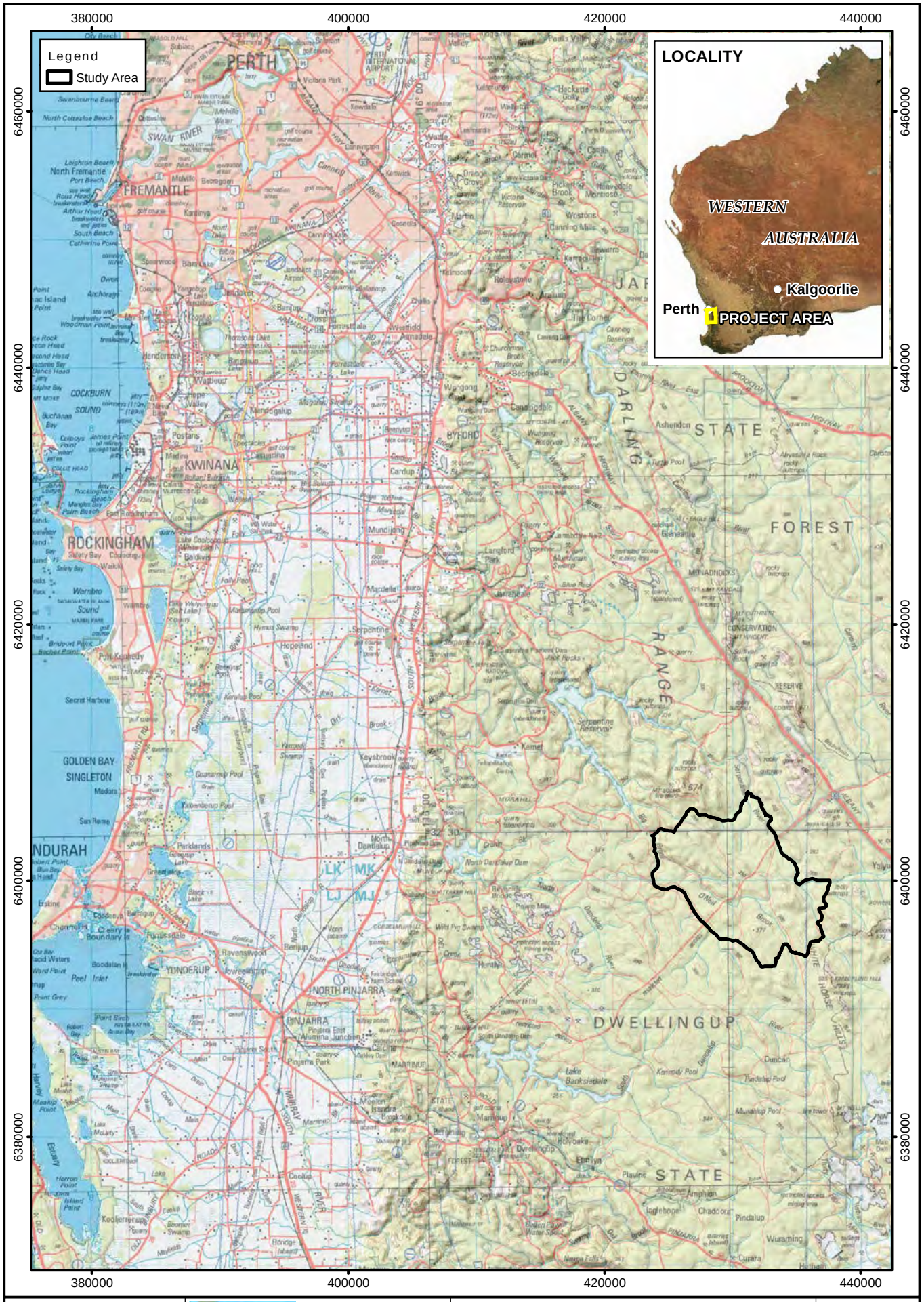
The following key Western Australian (state) legislation relevant to this survey includes the:

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

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

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

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



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Date: August 2023 | Rev: A | A4

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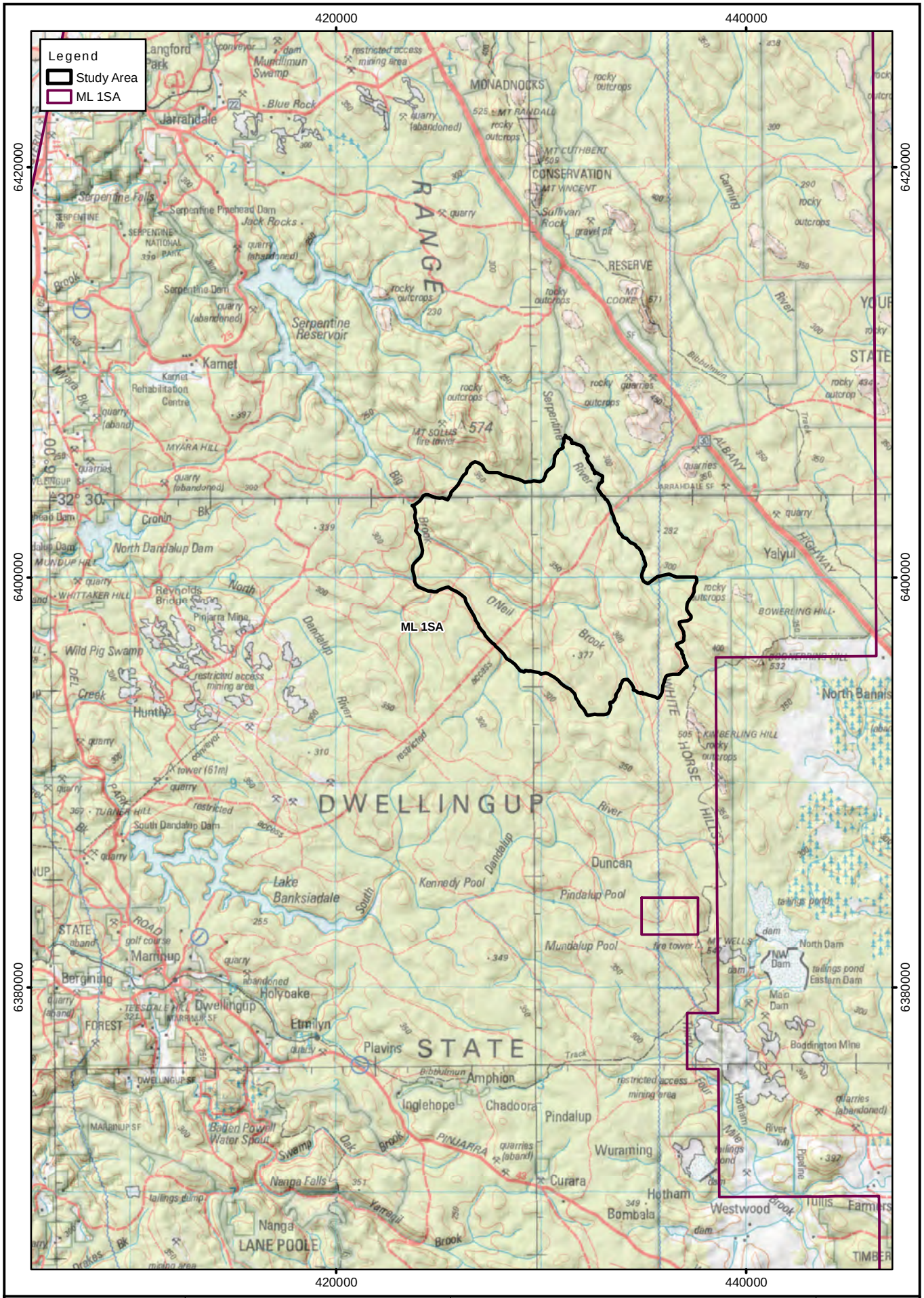
Oneil
Locality

Figure: **1**



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Oneil
Tenements

Figure:
2

2. OBJECTIVES

The objective of this assessment was to combined the earlier desktop assessment and the findings from the recent field studies of the ONeil survey area, including:

- A desktop assessment of the flora and vegetation of the ONeil 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 ONeil survey area;
- A summary of key findings from the detailed studies (plots, recording sites, transects and targeted surveys) the ONeil 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 2023a, 2023c) and plant collections held at the Western Australian Herbarium ([WAH] 1998 -), and plants listed by the Department of Climate Change, Energy and the Environment [DCCEEW] (2024b) under the EPBC Act;
- Review the conservation status of the vegetation types recorded by reference to current literature and current listings by the Department of Biodiversity, Conservation and Attractions (DBCA 2023a, 2024c), and vegetation as listed by the Department of Climate Change, Energy and the Environment [DCCEEW] (2024e) under the EPBC Act; and
- Prepare a report summarising the findings.

3. METHODS

3.1. Desktop Assessment

The NatureMap (DBCA 2007-) and *EPBC Act* Protected Matters Search Tool (DCCEEW 2023b) databases were used to identify the possible occurrence of flora (including threatened and priority taxa) and threatened and priority ecological communities within the ONeil survey area.

In addition, historical documentation and vegetation mapping of the northern Jarrah forest subregion that provide resource material for the floristics and vegetation of the ONeil survey area was reviewed, including Mattiske Consulting Pty Ltd (2009-2012) reports on their flora and vegetation surveys in the ONeil region. Nomenclature of flora species was checked against and is consistent with Florabase (WAH 1998-).

3.2. Field Studies

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 Heddle *et al.* (1980). Sites were pre-designated using a grid system overlaid on the survey area. Additional opportunistic sites were surveyed when changes in the vegetation, representing communities which would otherwise have been missed, were encountered whilst walking between designated survey sites. Site data was used to define vegetation types for each survey site located as a minimum on a 120m x 120m grid system within the survey area. This data was then used in combination with aerial imagery and field observations to map the vegetation of the survey area. Furthermore, searches for threatened, priority or Declared (plant) pests species were undertaken whilst walking between survey sites.

The following information was recorded at each vegetation assessment site:

GPS location	Easting, Northing and datum;
Soil types	gravels, sandy-gravels, sandy-loam-gravels, sandy-loams, loams, clay-loams, clays and peat;
Topography	ridge, upper slope, mid-slope, lower slope, valley floor and swamp;
Outcropping	type – granite, laterite, dolerite, and quantity – few, moderate, numerous;

Logging history	light, moderate or heavy, together with number of stumps within a 20 m radius;
Fire history	years since last fire; and
Dieback occurrence	*Phytophthora* spp. demarcation – field blazing, coloured flagging on trees, vegetation deaths, either old or recent.

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

Tree species

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

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

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-).

3.3. Survey Limitations

A general assessment was made of the current survey area against a range of factors that may have limited the outcomes and conclusions of this report (Table 1).

Table 1: Potential flora and vegetation survey limitations for the ONeil survey area

Potential Survey Limitation	Impact on Survey
Sources of information and availability of contextual information (*i.e.* pre-existing background versus new material)	Not a constraint: Reference resources such as mapping by Beard 1979, Mattiske and Havel 1998, previous vegetation mapping completed for Alcoa by E.M Mattiske and Associates together with online flora and vegetation information, has provided an appropriate level of information for the current survey.
Scope (*i.e.* what life forms, *etc.*, were sampled)	Not a constraint: Vascular flora, which were the focus of the present survey will be thoroughly sampled on a grid pattern within the survey area.
Proportion of flora collected and identified (based on sampling, timing and intensity)	Minor constraint: The survey areas were sampled on a grid pattern. 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. Only minor constraint was the difficulty of assessing the total extent of the Priority 1 *Hibbertia hortiorum* records as this taxon was included in the earlier *Hibbertia commutata* records in previous assessments. Thiele (2019) split the *Hibbertia commutata* into multiple taxa and as a result the historical records for *Hibbertia commutata* may include more occurrences of the Priority species in the survey area. One of the difficulties faced is that flowers and stamen arrangements are critical to the identification of some of the recently defined species and as such the proposed targeted flora work in spring should provide greater clarity on occurrence and populations. The relationships of the Priority *Hibbertia* species and the other two Priority species with the site-vegetation types was also reviewed and summarized. Further field studies in the spring months of 2024 should assist in clarifying the occurrences and populations.
Mapping reliability	Not a constraint: The vegetation will be assessed on a grid pattern within the survey area. This together with opportunistic survey sites will provide high quality data enabling the survey area to be mapped with a high level of confidence.
Timing, weather, season, cycle	Potential constraint: The EPA (2016a) recommends that flora and vegetation surveys in the South – West Botanical Province be conducted in Spring (September-November). The sampling was undertaken in the autumn of 2024 after a very dry period from October 2023 to April 2024 which led toa potential constraint. The latter should be addressed during the spring months of 2024 when further intensive studies is proposed through the targeted flora work and also the establishment of permanent plots. The extensive work undertaken in the area and in adjacent areas reduces the risk of not covering the flora species. With regard to the conservation significant flora, the majority identified as potentially occurring within the survey area can be recorded out of season with the exception of some orchid species which do not flower as regularly and some *Drosera* species. Further detailed work will be undertaken in 2024.
Disturbances (fire flood, accidental human intervention, *etc.*)	Potential Constraint: Previous logging activities have been undertaken for many decades in this area. The forestry areas may have been burned recently; this will affect the ability to accurately define vegetation communities. These land uses and activities may influence surveys in the area.
Access problems (*i.e.* ability to access survey area)	Not a constraint: Vehicle access was not restricted in the survey areas.
Experience levels (*e.g.* degree of expertise in plant identification to taxon level)	Not a constraint: All botanists had direct and recent experience working in the Jarrah Forest and working for Alcoa, 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.

4. RESULTS

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 in 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. Annual average rainfall at Dwellingup is 1221.3 mm (Bureau of Meteorology [BOM] 2024). Rainfall in 2022 and 2023 were lower than the longer term mean and the lack of substantial rain since October 2023 prior to the survey effort is clearly apparent in Figure 3. The trend of lowering rainfall is not replicated in similar changes to the temperature.

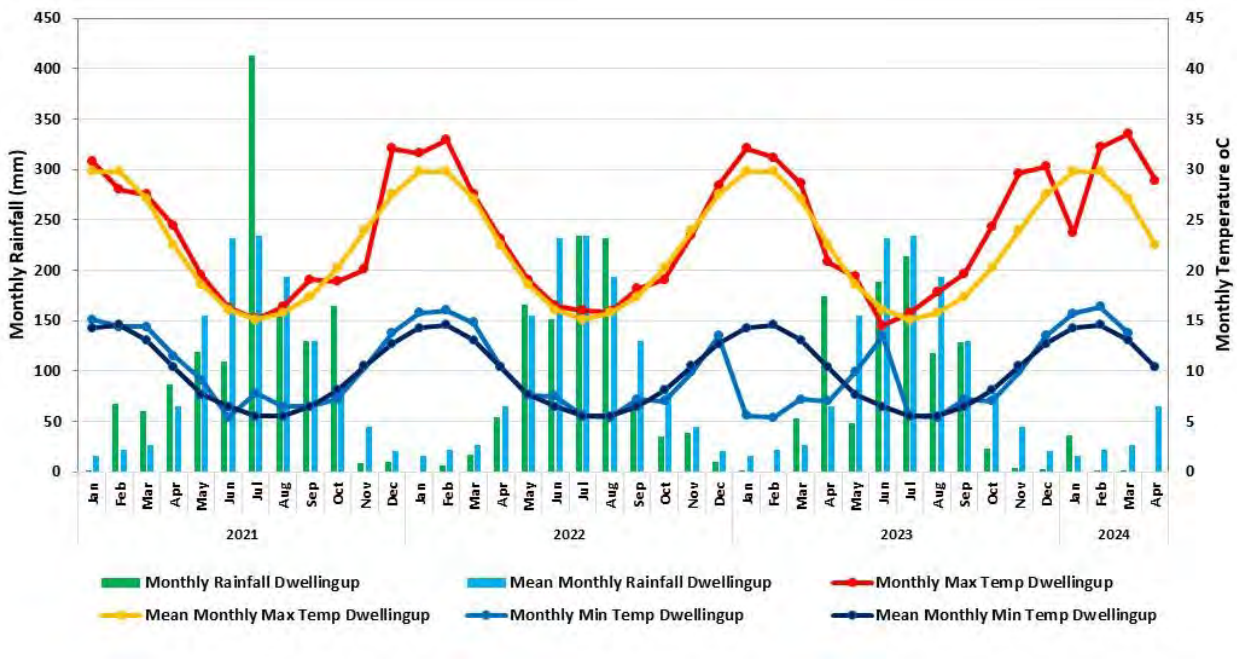
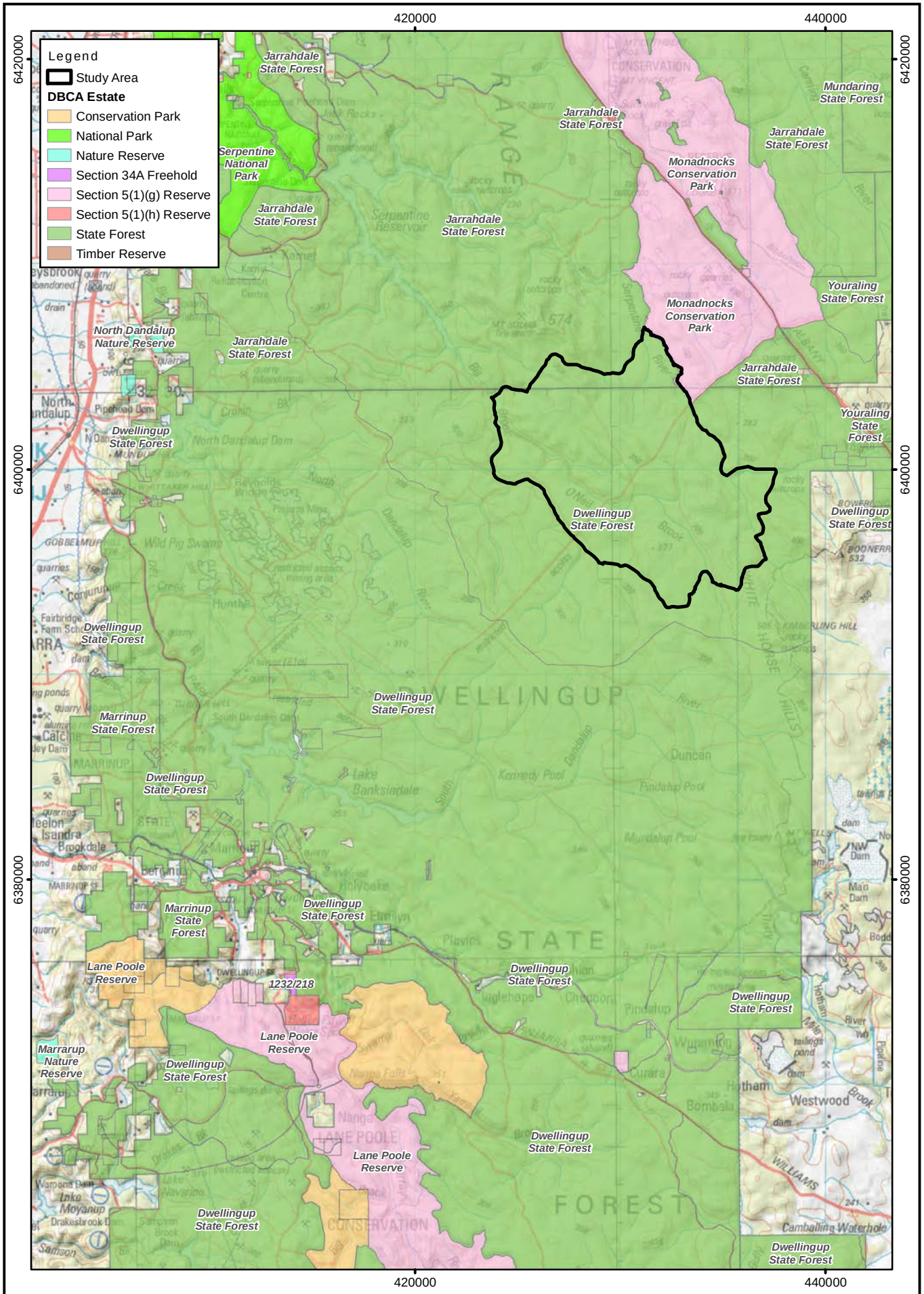


Figure 3: Climatic data for ONeil survey area (BOM 2024)
Long term average rainfall and temperature data from the Dwellingup weather station

4.2. DBCA Estates

The ONeil survey area is situated in State Forest to the north-east of Dwellingup (Figure 4).



Oneil
DBCA Estates

Figure: **4**

4.3. Geology, Soils and Topography

The ONeil 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 5 m or more of ironstone gravels in a yellow sandy matrix, and related lateritic podzolic soils with ironstone gravels in a sandy surface horizon. This 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 three 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.

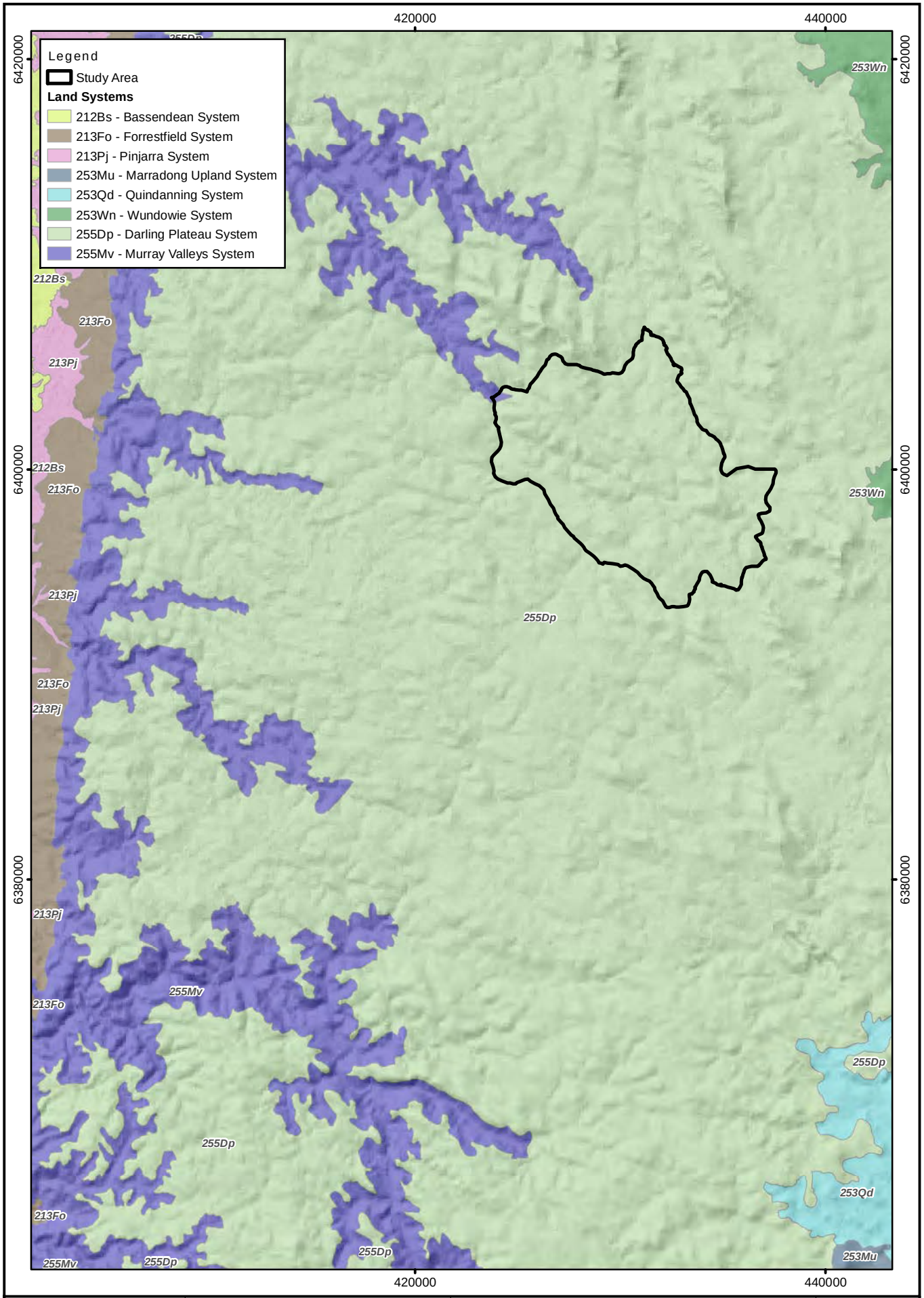
Cook: Hills rising above general plateau level ; mainly laterite but with some rock outcrop.

The Department of Primary Industries and Regional Development's (DPIRD) Land Systems present within the ONeil survey area (Figure 5, Table 2) includes:

1. Darling Plateau System (255Dp): Lateritic plateau. Duplex sandy gravels, loamy gravels and wet soils. Jarrah-marri-wandoo forest and woodland.
2. Murray Valleys System (255Mv): Western Darling Range from the Avon Valley to Harvey. Deeply incised valleys with red loamy earths, shallow duplexes and rock outcrop and Jarrah-marri-wandoo forest and woodland with mixed shrubland.

Table 2: Extent of Land Systems intersecting the ONeil survey area

Land System	Mapping Unit	Total Extent (ha)	Area of Intersection with the ONeil survey area	Proportion of Current Extent (%)
Darling Plateau System	255Dp	820265.7327	10389.023	1.27
Murray Valleys System	255Mv	132255.57160	25.507554	0.02



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Oneil
Land Systems

Figure: **5**

4.4. Regional Vegetation

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

The Pre-European vegetation system present within the ONeil survey area (Figure 6, Table 3) includes:

1. West and East Darling Systems
    a. Vegetation Association 3.3: Medium forest, jarrah-marri.

Table 3: Extent of pre-European vegetation associations intersecting the ONeil survey area

System	Vegetation Association	State-wide Pre-European Extent (ha)	Area of Intersection with the ONeil survey area (ha)	Proportion of Current Extent (%)
West Darling	3.3	485225.883	9971.097	2.05
East Darling	3.3	303349.645	443.432742	0.15

Heddle *et al.* (1980) and Mattiske and Havel (1998) described the dominant pre-European vegetation of the Darling System in a series of vegetation complexes (Regional Forest Agreement vegetation complexes) and determined how they relate to the landforms, soils and climatic conditions. Nine broad vegetation complexes occur in the ONeil survey area (Figure 7, Table 4), these are:

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

Dwellingup 2 (D2): Open Forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on lateritic uplands in subhumid and semiarid zones.

Dwellingup 4 (D4): Open forest of *Eucalyptus marginata* subsp. *thalassica* – *Corymbia calophylla* on lateritic uplands in semiarid and arid zones.

Cooke (Ce): Mosaic of Open Forest of E*ucalyptus marginata* subsp. *marginata* – *Corymbia calophylla* (subhumid zone) and open forest of *Eucalyptus marginata* subsp*. thalassica* – *Corymbia calophylla* (semi-arid and arid zones) and on the deeper soils adjacent to outcrops closed heath of Myrtaceae-Proteaceae species and lithic complex on granite outcrops and associated soils in all climatic zones with some *Eucalyptus laeliae* (semi-arid), and *Allocasuarina huegeliana* and *Eucalyptus wandoo* (mainly semiarid to perarid zones).

Murray 1 (My1): Open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* - *Eucalyptus patens* on valley slopes to woodland of *Eucalyptus rudis* – *Melaleuca rhaphiophylla* on the valley floors in humid and subhumid zones.

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.

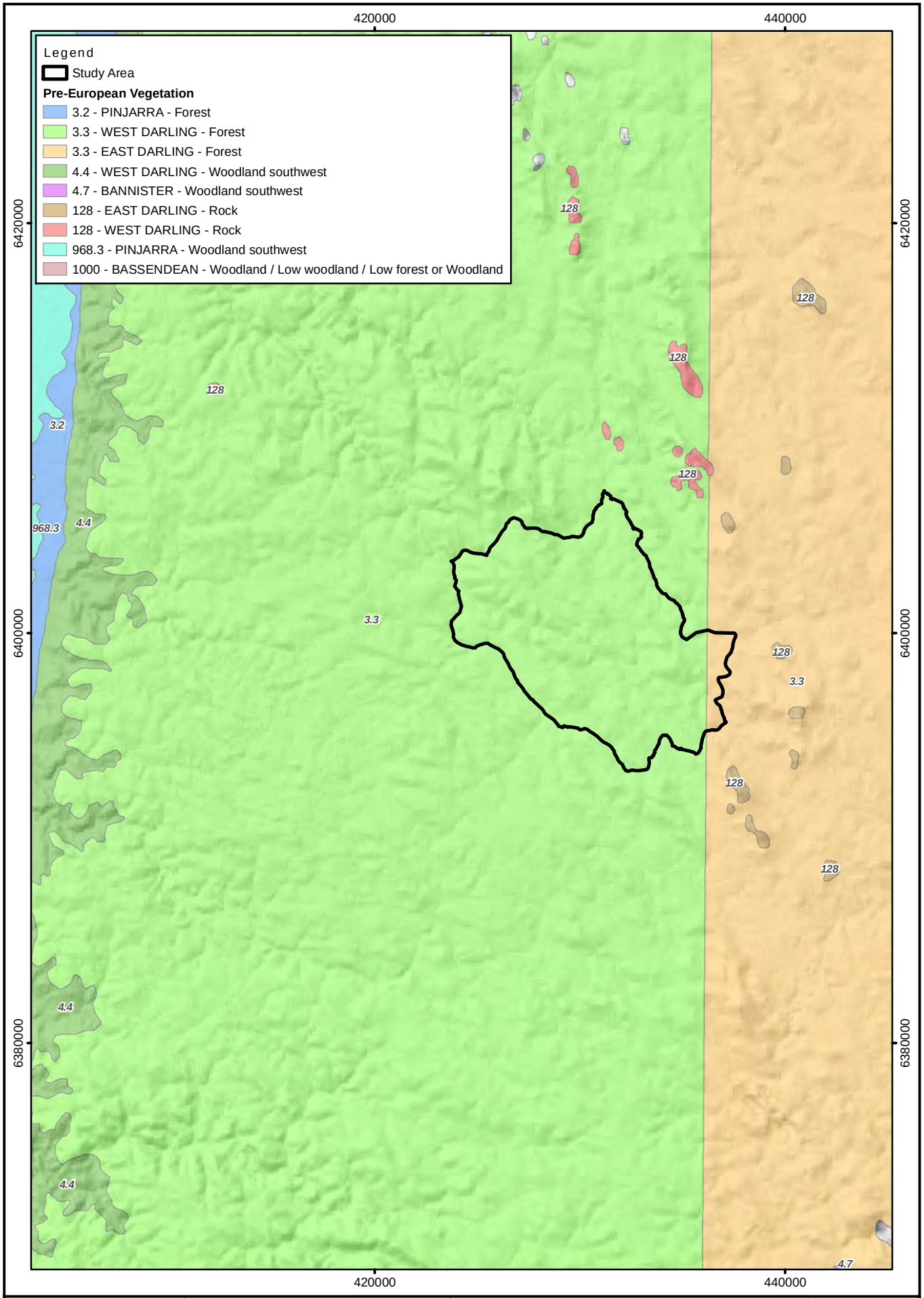
Pindalup (Pn): Open forest of *Eucalyptus marginata* subsp. *thalassica – Corymbia calophylla* on slopes and open woodland of *Eucalyptus wandoo* with some *Eucalyptus patens* on the lower slopes in semiarid and arid zones.

Swamp (S): Mosaic of open woodland of *Melaleuca preissiana – Banksia littoralis,* closed scrub of Myrtaceae spp., closed heath of Myrtaceae spp., and sedgelands of *Baumea* and *Leptocarpus* spp. On seasonally wet and moist sand, peat and clay soils on valley floors in all climatic zones.

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 (DCCEEW 2024c). 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).

Table 4: Extent of Vegetation Complexes intersecting the ONeil survey area

Area (Blocks)	Vegetation Complex	Vegetation Class	Total Extent (ha)	Area of Intersection with the ONeil survey area (ha)	Proportion of Current Extent (%)
Oneil	Dwellingup 1	D1	297624.846	3219.62	1.08
	Dwellingup 2	D2	120755.000	2190.44	1.81
	Dwellingup 4	D4	187588.996	77.96	0.04
	Cooke	Ce	51872.103	371.23	0.72
	Murray 1	My1	97562.811	25.49	0.03
	Yarragil 1	Yg1	113828.123	509.89	0.45
	Yarragil 2	Yg2	71234.370	1843.63	2.59
	Pindalup		236540.595	1502.94	0.64
	Swamp	S	76245.982	673.33	0.88



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Scale: 1:250,000
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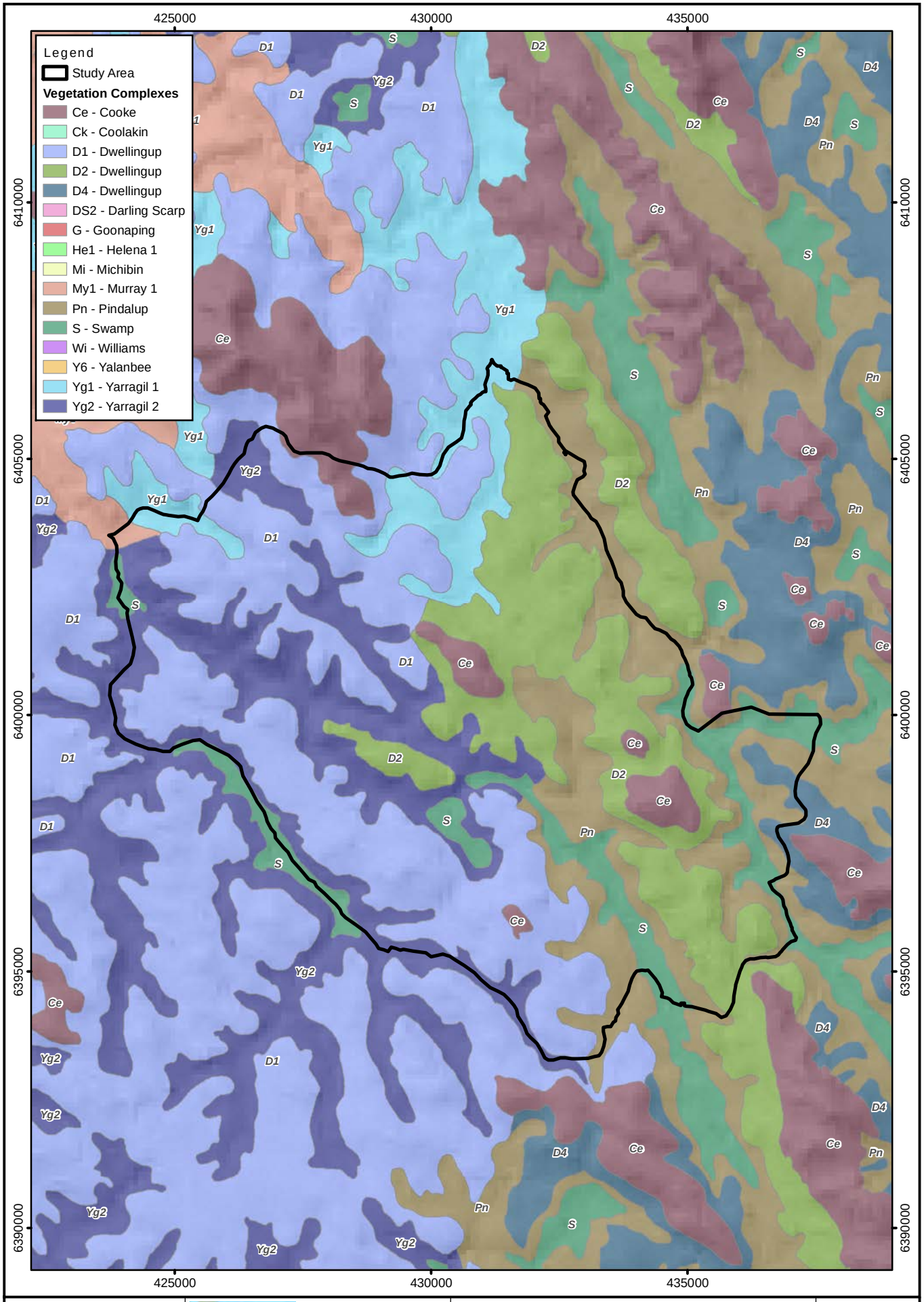
Oneil

Pre-European Vegetation

Figure: **6**



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

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Oneil

Vegetation Complexes

Figure: **7**

4.5. Potential Flora

Based on the previous nearby surveys and the recent additional studies a total of 459 vascular plant taxa, representative of 168 genera and 59 families (Appendix B), have the potential to occur within the ONeil survey area (Mattiske Consulting 1998-2023). The most commonly represented families were Fabaceae (67 taxa), Proteaceae (53 taxa), Myrtaceae (38 taxa) and Asparagaceae (253 taxa).

4.6 Potential Threatened and Priority Flora

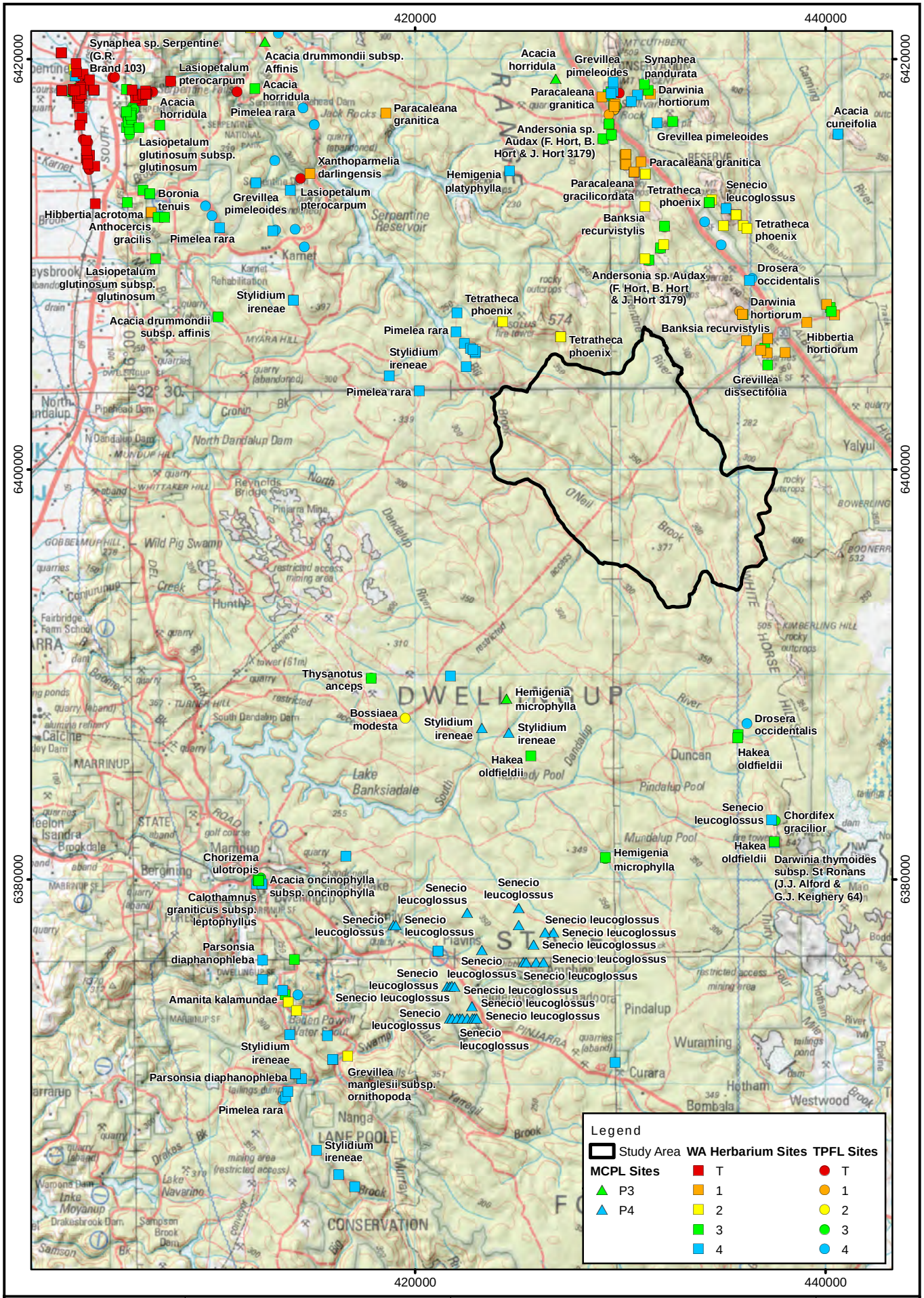
A total of twelve threatened flora species and 37 priority flora species has the potential to occur in the ONeil survey area. Of the threatened flora species, all are considered to have a very low potential of occurring in the ONeil survey area due to the lack of suitable habitat and also know distributions away from the survey area.

In 2024, the data indicated that of the Priority flora species, six priority flora species have a high potential to be in the survey area and seven priority flora species have a moderate or moderate to high potential to be in the survey area (Figure 8 and Appendix C).

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

- Known records within a 20 km radius of the centre of the survey area (as described above). 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.

All potential threatened and priority flora are listed in Appendix B, 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 ONeil survey area. In undertaking such an assessment of potential threatened and priority species there is a need to rely on state and federal databases that are not necessarily up to date. In considering likelihood of species due consideration was also given to nearby and previous findings of species and their site preferences.



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Oneil

Potential Threatened and Priority Flora

Figure: **8**

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

On the basis of databases and previous surveys near or within the ONeil survey areas a total of 15 introduced taxa has the potential to occur in the ONeil survey area (Appendix C). None of the weeds are declared pest organisms pursuant to section 22 of the BAM Act (DPIRD 2024) and none are listed as Weeds of National Significance (DCCEEW 2024d).

An assessment of the likelihood that the significant weed species (Weeds of National Significance and/or declared pest organisms) would occur within the ONeil survey area was determined using the following criteria:

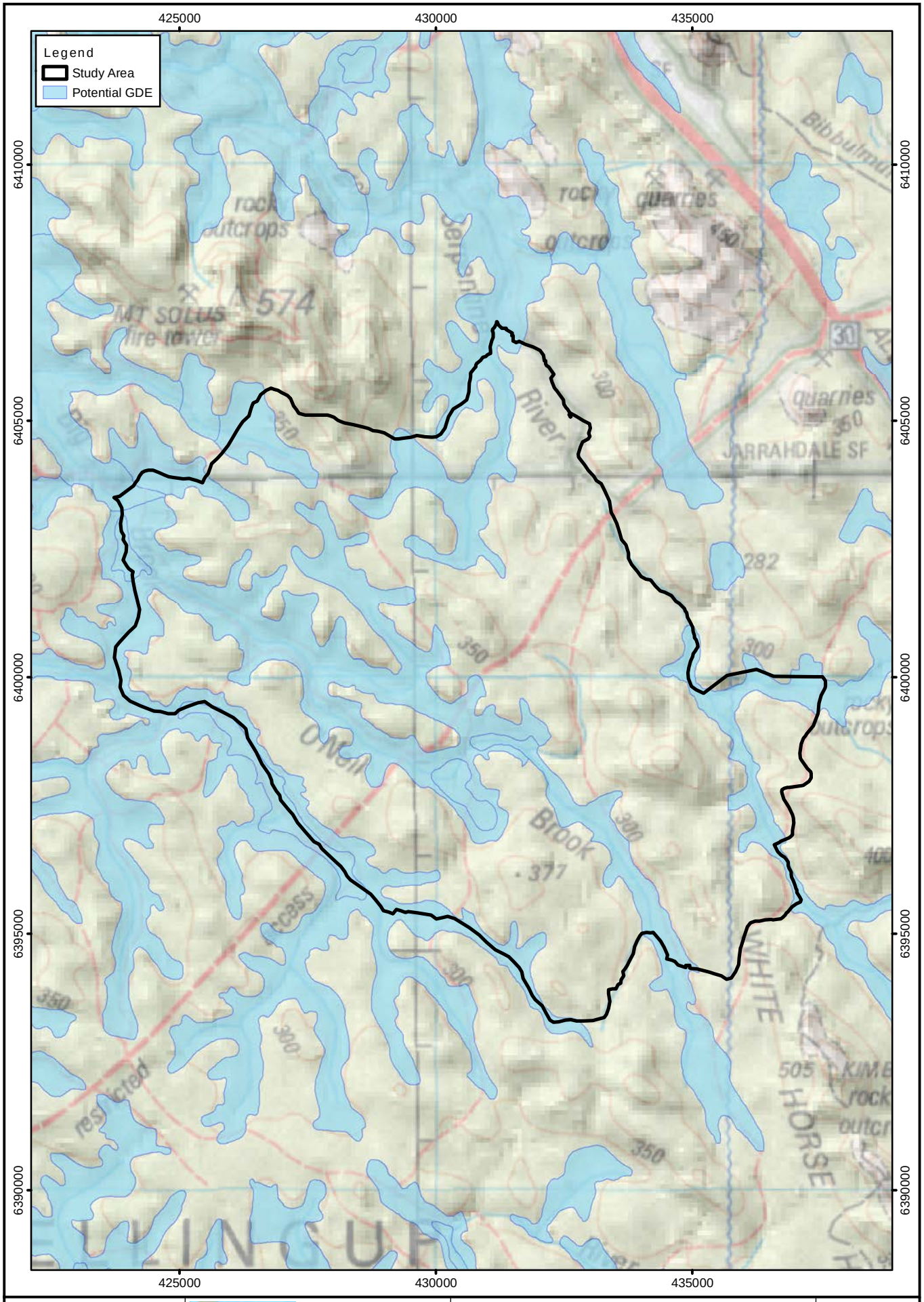
- Known records within a 10-20 km radius of the centre of the survey area, based on studies that overlap the survey area or that have been recorded in nearby areas
- More recent, proximal and numerous records were ranked higher.
- Potential presence of suitable habitat and landforms for the species within the survey area (e.g. soil type, bedrock type, topography, drainage lines, vegetation).

The majority of the weeds are relatively short-lived species that will not compete with native species unless the vegetation is cleared or disturbed.

4.8 Groundwater Dependant Ecosystems

The potential groundwater dependent ecosystems were determined on the basis of the extent of the vegetation complexes (Yarragil 2 and Swamp), Figure 9. In view of the extensive flora and vegetation studies in the northern Jarrah forest subregion 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 in the absence of site-vegetation type data.

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 patens, Hypocalymma angustifolium, Melaleuca preissiana, Melaleuca viminea* and *Taxandria linearifolia.*



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Oneil

Potential GDE

Figure:

9

4.8 Old Growth Forests

Based on data from Department of Biodiversity, Conservation and Attractions, there are no old growth forests occurring in the ONeil survey area (Figure 10).

Due to the proximity of the ONeil survey area to the main North-East Road is unlikely that there will be additional old growth forests in the survey area.

The data as presented on the history of harvesting in the area reflects the age of logging on the ONeil survey area, see Figure 11. The data in Figure 11 reflects the more recent logging in the northern options which in part reflects the operational activities of Alcoa (pre mining). Some of the valley areas have not been logged for some time and as such reflect the linear patterns of these systems.

4.10 Previous Surveys

Mattiske Consulting has previously mapped the vegetation in the areas surrounding the ONeil survey area. Recent flora and vegetation studies relevant to the ONeil survey area include the previous flora and vegetation studies and transect monitoring has been done in the nearby Cameron block (including the sub-catchment Gordon) since 1993 (E.M. Mattiske and Associates 1993 to 1994; and Mattiske Consulting 1996 to 2006) and the ONeil survey areas (Mattiske Consulting Pty Ltd 2009, 2012, 2024).

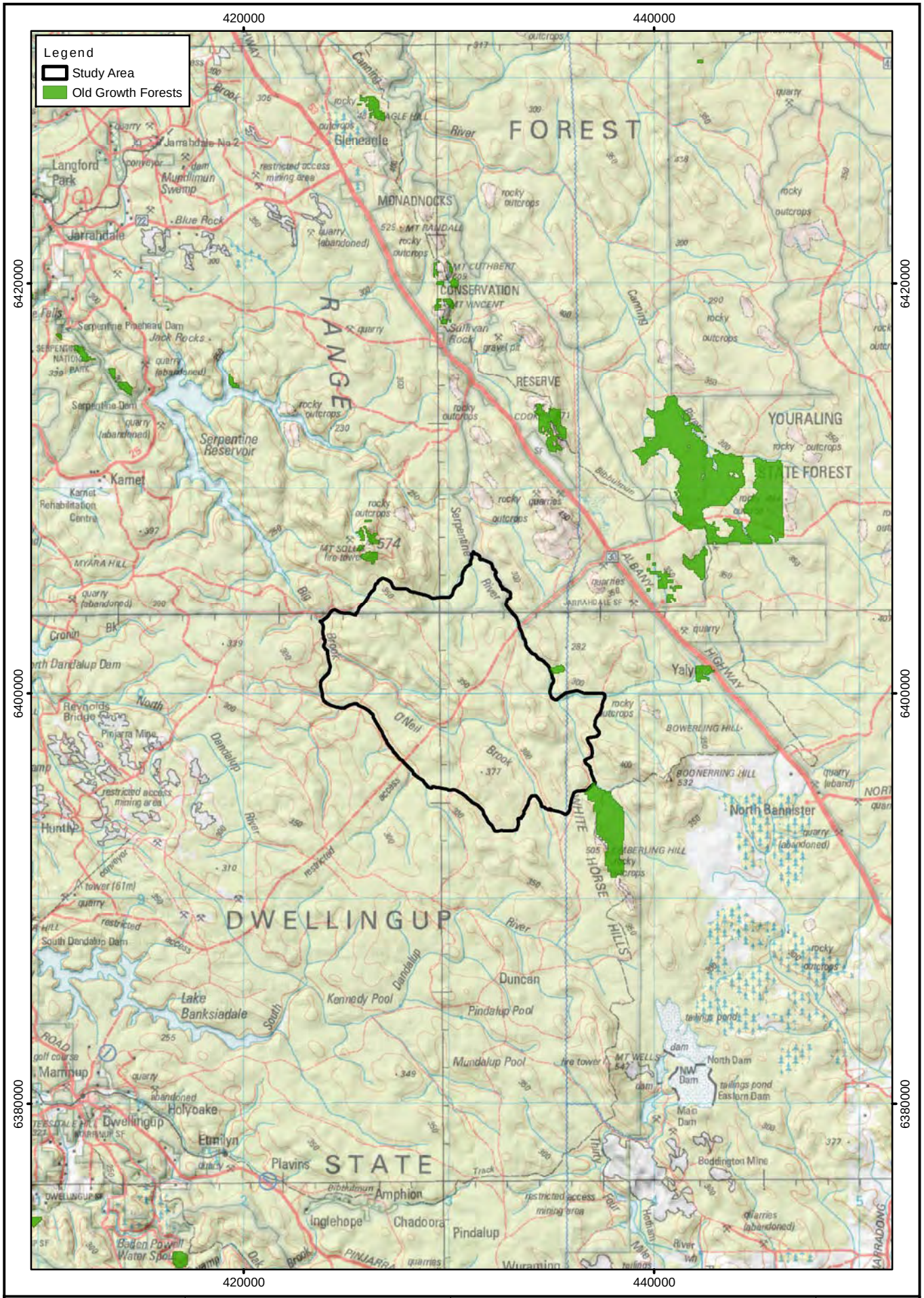
The survey effort in the ONeil survey areas includes multiple survey efforts by Mattiske Consulting from the earlier flora and vegetation studies to the more recent targeted work and assessment of sites in a range of the site-vegetation types within the survey area that extend northwards and southwards from those areas previously mapped. This effort extends the flora and vegetation studies undertaken in the Northern Jarrah Forest over some 40 years.

4.11 Potential Threatened and Priority Ecological Communities

There are no threatened ecological communities (TECs) listed at Commonwealth level pursuant to sections 181 and 182 of the *EPBC Act* or listed by the DCCEEW (2024e) or at State level pursuant to Part 2 of the *BC Act* and as listed by DBCA (2023c) with the potential to occur within the ONeil survey area.

There are no TECs listed at Commonwealth or State level, or PECs listed at State level which would be likely to occur in the ONeil survey area; although further north the vegetation associated with granite outcrops has been classified as a PEC and further east and southeast the vegetation associated with granites has been classified as a PEC near Mt Saddleback (DBCA 2023b) .

One of the difficulties faced in assessing the potential for PECs is that in many instances there is a lack of detailed data behind the delineation. In some sections of the Oneil area there are some of the values associated with the shallow soils of the granite outcrop areas that may have some values that overlap with the PEC as defined by DBCA 2023b for the outcrop areas to the north of the survey area and the outcrop areas near Mt Saddleback. As these areas occur on outcrop or shallow soil areas associated with outcrops it is unlikely that these areas would be disturbed. Further many of the values are represented in conservation areas to the (Monadnocks and to the east).



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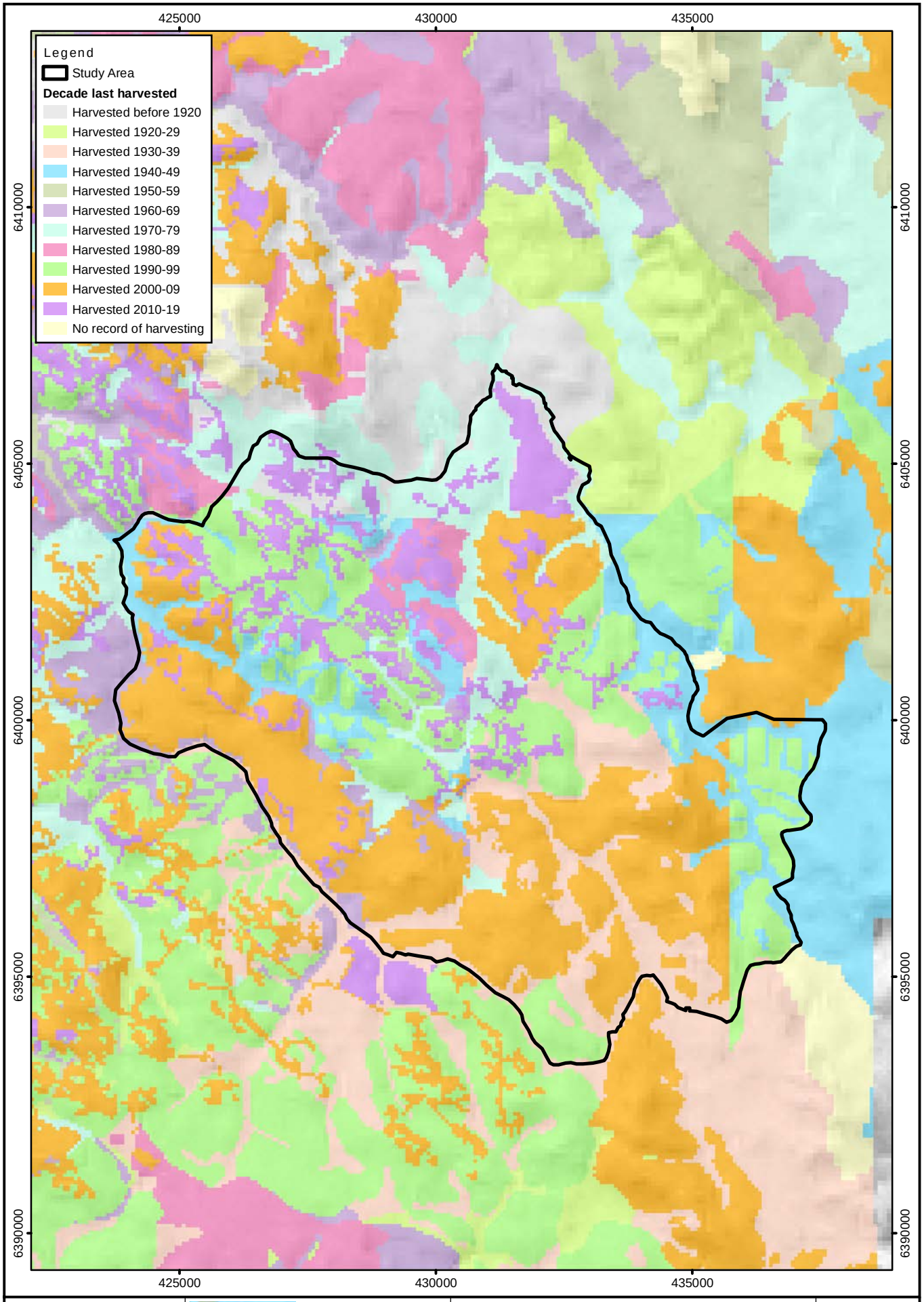
Oneil East
Old Growth Forest

Figure:

10



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Oneil

Harvested Year

Figure:

11

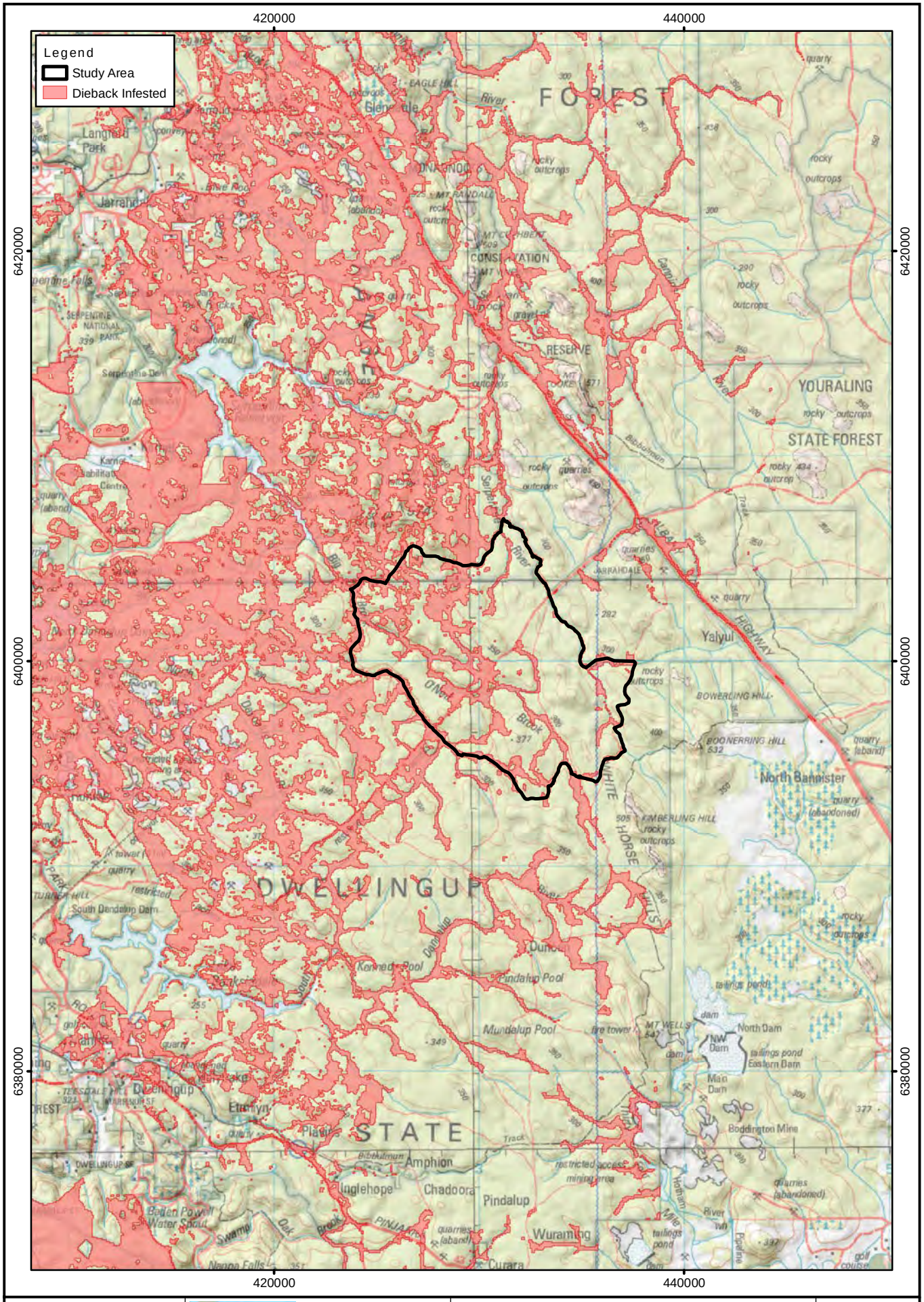
4.12 Wetlands of International Importance (Ramsar)

The Peel-Yalgorup System, a listed Ramsar Wetland of International Importance, is located adjacent to the City of Mandurah and consists of shallow estuaries, freshwater marshes and coastal saline lakes that include the Harvey Estuary, Peel Inlet, Lake McLarty, Lake Mealup and ten Yalgorup National Park wetlands (DCCEEW 2024f). The fringing vegetation is mainly samphire, rushes, sedges and paperbark communities. The Peel-Yalgorup System supports a wide variety of waterbirds, invertebrates and estuarine and marine fish and is considered the most important area for waterbirds in south-western Australia (DCCEEW 2024f). Whilst these potential values were recognized in the National database search (DCCEEW 2024f) these wetlands occur west of the survey area and not in the ONeil survey area.

4.13 Review of Dieback Occurrence

The dieback data as shown on Figure 12 reflects the most up to date dieback interpretation data from both DBCA and Glevan Consulting for the ONeil r survey area. Sections of the ONeil survey area have been infested with the dieback disease caused by *Phytophthora cinnamomi*. In the survey area the dieback infections are concentrated to the valleys systems. There may be some differences also in coverage and sampling in some of the areas of the ONeil survey area.

In the summer of 2023/2024 the vegetation of the south west was influenced by a lack of rain since October 2023. The latter dry conditions led to the extensive loss of condition of shrubs and trees has been evident, particularly near granite outcrop areas. This loss of condition in the plant species and vegetation may at times be confused with the evidence of decline from the dieback disease.



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CAD Ref: a1992_F025_09

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Oneil
Dieback

Figure:

12

5 RESULTS

5.1 Survey Effort

The survey effort is summarized in Table 5 and Figure 13 and in the following text.

- Detailed studies were undertaken by the Mattiske Consulting teams from 2009 to 2024 for defining and mapping the site-vegetation types.
- Additional targeted flora and vegetation mapping was undertaken in autumn months of 2024.
- It is intended to establish permanent plots and re-assess some long term monitoring transects in the area in the spring months of 2024 to supplement the earlier detailed studies in some of the valley systems.

The survey efforts include results from 2009 through to 2012 and more recently in 2023 and 2024 in the ONeil area and in adjacent areas. These studies have been supplemented by extensive detailed plot and transect studies in the Northern Jarrah Forest over 40 years, including permanent sampling sites within the current Oneil area which are intended to be re-assessed in the spring months of 2024 and where required additional plots will be established to include the range of flora and vegetation values in the ONeil area.

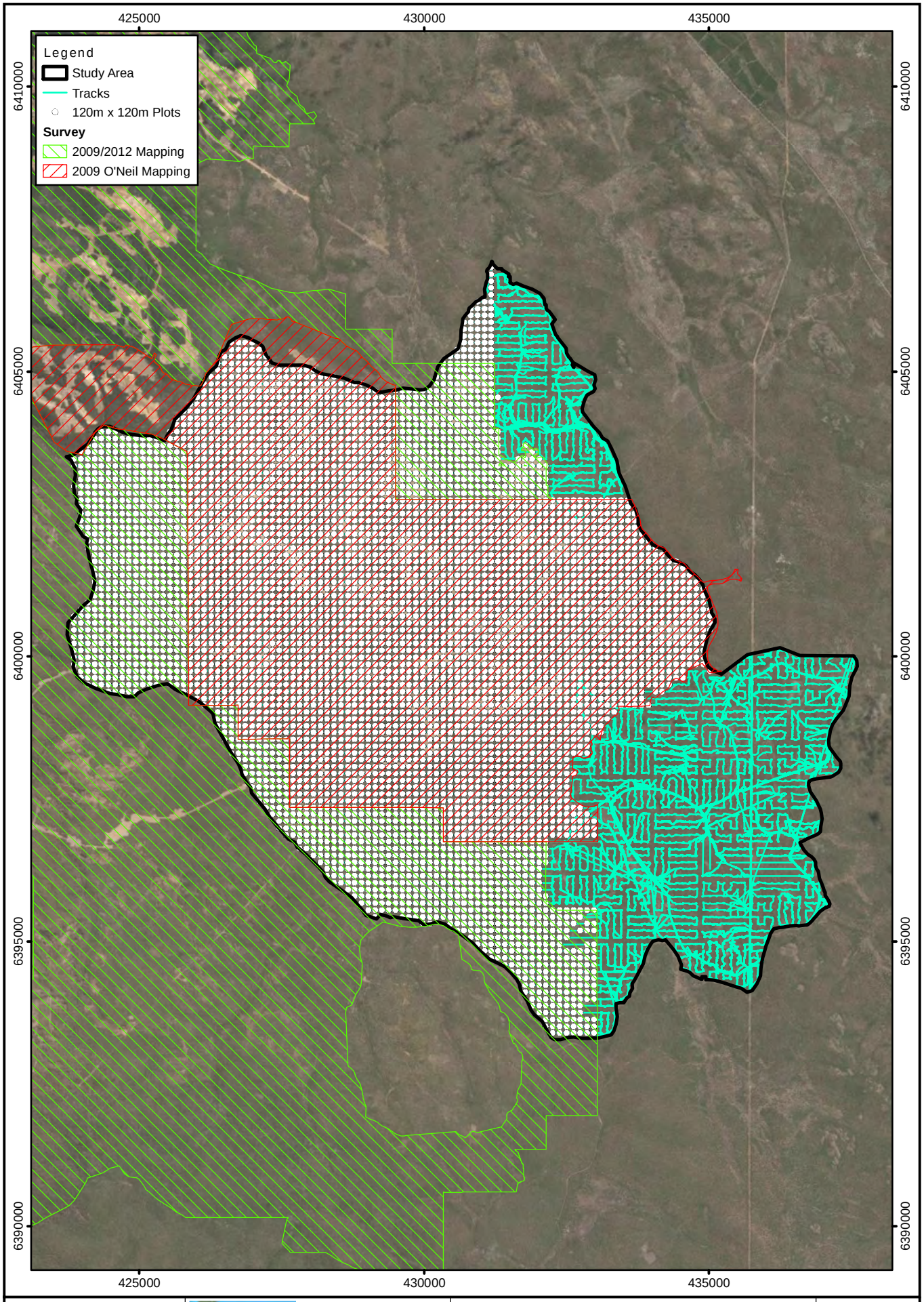
It is important to recognise that the vegetation mapping efforts in seasons outside of the spring months can still be undertaken as the vegetation mapping relies on perennial species which persist through the seasons. Further the perennial species persist through different seasons and the key indicators can be recognized throughout the year. The site-vegetation types extend the vegetation mapping over large areas of the Northern Jarrah Forest and as such integrate the flora, vegetation and site values which provides additional and critical information to the understanding of patterns in the area. The site-vegetation type approach was developed by Dr J Havel (1975a, 1975b) in close consultation with Dr D Goodall from CSIRO in the mid 1970's. Whilst this approach may differ from some other studies in Western Australia the development by Havel and Goodall was undertaken to define a series of key indicators and site conditions that would enable a finer definition of the northern Jarrah Forest communities. Such an approach enabled the subdivision of the main forest types which relied heavily on the structural components and the dominant trees. The latter broader approach is evident in the regional mapping at a coarser level as undertaken for the Pre-European vegetation mapping as undertaken by Beard 1979. The adoption of the site-vegetation type approach also enabled consideration of representation in the wider Northern Jarrah Forest and as such is supplemented by the vegetation studies during the System 6 (Heddle *et al*. 1980) and the Regional Forest Agreement investigations (Mattiske and Havel 1998) supported by state and federal government agencies.

Table 5 provides a summary of the number of recording sites in each site-vegetation type. The more restricted site-vegetation types are obviously less well represented in the recording sites. None of the site-vegetation types are restricted to the survey area.

Table 5: Sampling Intensity in the respective areas of each Site-Vegetation Type

Site-vegetation Type	No Recording Sites	ONeil (ha)	% Total Survey Area
A	120	91.579	0.88
AC	536	398.385	3.83
AD	46	40.755	0.39
AX	2	1.556	0.01
AY	34	31.460	0.30
C	4	5.308	0.05
CL	206	142.206	1.37
CW	284	198.684	1.91
D	1484	1050.352	10.09
DA	30	21.988	0.21
DG	268	187.469	1.80
E	-	0.125	0.00
G	60	44.491	0.43
G1	16	15.733	0.15
P	116	85.408	0.82
PS	1988	1409.863	13.54
PT	2	2.287	0.02
PW	342	251.249	2.41
R	226	170.902	1.64
R/G	6	6.152	0.06
Rehab	1418	1020.812	9.80
S	3744	2661.758	25.56
SP	796	565.198	5.43
ST	544	388.111	3.73
SW	750	570.587	5.48
T	434	318.305	3.06
TS	766	549.993	5.28
W	216	153.078	1.47
Y	24	16.982	0.16
YG	24	13.751	0.13
		10414.530	100.00

In summary, the work undertaken to date on the Oneil survey area supplements extensive studies previously within and adjacent to the current survey area and as such meets the EPA (2016a and 2016b) guidelines. With the proposed supplementary flora and vegetation studies in the spring months of 2024 the effort exceeds the effort undertaken on many projects as it enables a detailed and comprehensive assessment of the survey area in the local and regional context.



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Oneil
Survey Effort

Figure:
13

5.2 Flora

In the more recent targeted flora and vegetation studies a total of 353 vascular plant taxa, representative of 143 genera and 61 families (Appendix C) were recorded in the ONeil survey area in 2024. If added to the recent work in the nearby areas between 2009 and 2023 this leads to a total of 536 vascular plant species from 182 genera and 66 families (Appendix C) for the wider area within and near this survey area. The recent 2024 studies recorded taxa in the following dominant families - Proteaceae (51 taxa), Fabaceae (45 taxa), Myrtaceae (37 taxa), Asparagaceae (18 taxa), Dilleniaceae (16 taxa), Ericaceae (16 taxa), Cyperaceae (15 taxa) and Asteraceae (15 taxa). This higher number of species appeared to be related to the wider valleys with increasing variation in soil types and the increased occurrence of shallow soils associated with the granite outcrops.

5.3 Threatened and Priority Flora

A total of 4 priority flora species (*Hibbertia ?ambita* P1, *Hibbertia hortiorum* P1, *Grevillea dissectifolia* P3 and *Senecio leucoglossus* P4) were recorded in the ONeil survey area. The *Hibbertia hortiorum* and *Hibbertia ?ambita* occurrences appear to reflect the more easterly occurrence of these two species and in addition appears to reflect the more detailed studies of the *Hibbertia* genera by Kevin Thiele (2019). Recent work indicates that the *Hibbertia* Priority species occur outside of this ONeil survey area and as a result the findings suggest that there may be larger populations in a wider area Florabase, WAH 1998 -). Currently *Hibbertia ambita i*s known from 17 records and *Hibbertia hortiorum* is known from 12 records at the State Herbarium collection. *Hibbertia hortinorum* was recorded largely in the valley systems in the south0eastern section of the ONeil survey area. This distribution appears to align with the occurrences on the regional databases (Figure 8).

Grevillea dissectifolia (P3) has mainly been recorded in the valley systems in the southern section of the survey area. This species is known from 24 records at the State Herbarium and was previously known as *Grevillea manglesii* subsp. *dissectifolia* on older records.

Senecio leucoglossus (P4) has mainly been recorded extensively as scattered plants through the northern Jarrah forest. One specimen of this species wase confirmed at the State Herbarium (ACC10469/E). This species tends occur on lateritic soils and is known from 45 specimens at the State Herbarium. This species general mainly occurs in Jarrah-Marri-Bull Banksia (*Eucalyptus marginata – Corymbia calophylla – Banksia grandis*) forests. This species was recorded at three locations within the ONeil survey area, but has been recorded regularly as scattered occurrences in other forest areas by the Mattiske team.

5.4 Introduced Species

A total of 11 introduced species were recorded on the 2024 survey areas and some 20 species over the wider area, Appendix C. None of the weeds are declared pest organisms pursuant to section 22 of the BAM Act (DPIRD 2024) and none are listed as Weeds of National Significance (DCCEEW 2024d).

5.5 Vegetation

A total of 27 site-vegetation types were defined and mapped in the ONeil survey area and an addition two mapping units (CL cleared land and Rehabilitation areas), Table 6 and Figures 14.1 and 14.2. The site-vegetation types were defined on the basis of key species and site parameters as defined in Havel (1975a and 1975b) for the Jarrah forest and as refined and developed by Mattiske over the last 40 years.

The results presented in Table 6 for each site-vegetation type also reflect the extent of the site-vegetation types and their percentage representation in the survey area. It is clearly apparent that there are some dominant site-vegetation types that dominate the ONeil survey area (namely P, PS, S, SP, ST, T and TS which together cover 57.41% of the survey area). A total of some 11.17% of the survey area has been either cleared or rehabilitated within the ONeil survey area.

Table 6: Summary of site-vegetation types as defined for the ONeil survey area based on Havel (1975a and 1975b) site-vegetation types as defined for the northern Jarrah forest

	SVT Code	Description	Total Area (ha)	% Survey Area
Swamps and Broad Valleys	A	Open Woodland of *Eucalyptus rudis – Melaleuca preissiana - Eucalyptus patens - Banksia littoralis* with dense stands of *Melaleuca viminea, Hakea varia, Taxandria linearifolia* and *Astartea scoparia* in understorey on broad swamps and water-courses.	91.579	0.88
	AC	Open Woodland of *Eucalyptus rudis – Melaleuca preissiana - Eucalyptus patens - Banksia littoralis* with dense *Taxandria linearifolia* and *Astartea scoparia* in understorey on broad swamps and water-courses.	398.385	3.83
	AD	Low open woodland of *Eucalyptus rudis* and *Eucalyptus marginata* over *Banksia littoralis, Hakea prostrata* and *Pericalymma ellipticum* over low shrubs and herbs on leached sands over sandy-gravel on lower slopes.	40.755	0.39
	AX	Open Woodland *of Eucalyptus rudis – Melaleuca preissiana* with dense understorey of mixed *Melaleuca* species on clay soils in swamps.	1.556	0.01
	AY	Open woodland of *Eucalyptus wandoo* over *Hakea varia, Hypocalymma angustifolium, Babingtonia camphorosmae* and *Gastrolobium calycinum* over herbs and sedges on clay-loams in seasonally wetter valley floors.	31.460	0.30
	D	Open Forest of *Eucalyptus marginata -Corymbia calophylla – Eucalyptus patens - Alllocasuarina fraseriana - Hakea prostrata* on lower slopes with mixed low understorey species, including *Babingtonia camphorosmae, Daviesia decurrens, Davieisa preissii* and *Acacia extensa* on clay loams to gravelly clay-loams.	1050.352	10.09
	DA	Open Forest of *Eucalyptus marginata -Corymbia calophylla – Eucalyptus patens - Alllocasuarina fraseriana - Hakea prostrata* on lower slopes with patches of *Melaleuca preissiana, Banksia littoralis* over mixed low understorey species, including *Babingtonia camphorosmae* and *Astartea scoparia* on clay loams to gravelly clay-loams.	21.988	0.21
	DG	Open Forest of *Eucalyptus marginata -Corymbia calophylla – Eucalyptus patens - Alllocasuarina fraseriana - Hakea prostrata* on lower slopes with mixed low understorey species, including *Grevillea bipinnatifida* and *Babingtonia camphorosmae,* on clay loams to gravelly clay-loams.	187.469	1.80
	E	Open Forest to Woodland of *Eucalyptus marginata - Corymbia calophylla* with scattered understorey, including *Kingia australis, Mesomelaena tetragona* and *Babingtonia camphorosmae* on sandy gravels on lower slopes.	0.125	0.001
Valley Floors and Lower Slopes	C	Woodland to Open Forest of *Eucalyptus patens – Corymbia calophylla - Banksia littoralis* with dense *Taxandria linearifolia* and *Astartea scoparia* in understorey on creek-lines and water-courses.	5.308	0.05
	CW	Woodland to Open Forest of *Eucalyptus patens – Eucalyptus megacarpa - Corymbia calophylla - Banksia littoralis* with dense *Taxandria linearifolia* and *Astartea scoparia* in understorey on creek-lines and water-courses.	198.684	1.91
	W	Open Forest of *Eucalyptus megacarpa - Eucalyptus patens – Corymbia calophylla* on lower slopes with mixed low understorey species, including *Hypocalymma angustifolium* on seasonally moister sandy-loam gravelly soils.	153.078	1.47
	Y	Open woodland of *Eucalyptus wandoo* over *Hypocalymma angustifolium* and *Babingtonia camphorosmae* over herbs and sedges on clay-loams on seasonally moister lower slopes.	16.982	0.16
	YG	Open woodland of *Eucalyptus wandoo* over *Hypocalymma angustifolium, Babingtonia camphorosmae, Grevillea bipinnatifida* and *Allocasuarina humilis* over herbs and sedges on clay-loams on seasonally moister lower slopes underlain by outcrops.	13.751	0.13
Slopes with seasonal soil moisture	SW	Open Forest of *Eucalyptus marginata - Corymbia calophylla – Banksia grandis* with scattered understorey, including *Adenanthos barbiger, Hypocalymma angustifolium* and *Styphelia tenuiflora* on seasonally moister sandy-gravelly soils.	570.587	5.48
	PW	Open Forest of *Allocasuarina fraseriana - Eucalyptus marginata - Corymbia calophylla* with scattered understorey, including *Grevillea wilsonii, Adenanthos barbiger, Babingtonia camphorosmae* and *Hypocalymma angustifolium* on sandy gravels.	251.249	2.41
Shallow Outcrop Areas	R	Open Woodland of *Eucalyptus marginata - Corymbia calophylla* on fringes of granite outcrops or shallow soils.	170.902	1.64
	R/G	pen Woodland of *Eucalyptus marginata - Corymbia calophylla* with patches of Heath of Proteaceae – Myrtaceae species on fringes of granite outcrops or shallow soils.	6.152	0.06
	G	Mosaic of Open Woodland of *Eucalyptus marginata – Corymbia calophylla*, mixed Proteaceae – Myrtaceae heath and Lithic Complex associated with granite outcrops.	44.491	0.43
	G1	Mixed Proteaceae – Myrtaceae heath and Lithic Complex associated with granite outcrops.	15.733	0.15

Table 6: Summary of site-vegetation types as defined for the ONeil survey area based on Havel (1975a and 1975b) site-vegetation types as defined for the northern Jarrah forest (continued)

	SVT Code	Description	Total Area (ha)	% Survey Area
Slopes and Ridges - Sandy Loam Gravels	P	Open Forest of *Allocasuarina fraseriana - Eucalyptus marginata - Corymbia calophylla* with scattered understorey, including *Grevillea wilsonii* and *Adenanthos barbiger* and low shrubs, herbs and sedges on sandy gravels.	85.408	0.82
	PT	Open Forest of *Allocasuarina fraseriana - Eucalyptus marginata - Corymbia calophylla - Banksia grandis* with scattered understorey, including *Adenanthos barbiger, Leucopogon verticillatus, Pteridium esculentum* and *Bossiaea aquifolium* subsp. *aquifolium* on sandy-loam gravels.	2.287	0.02
	PS	Open Forest of *Allocasuarina fraseriana - Eucalyptus marginata - Corymbia calophylla - Banksia grandis* with scattered understorey, including *Adenanthos barbiger, Leucopogon capitellatus* on gravels and sandy gravels.	1409.863	13.54
	SP	Open Forest of *Allocasuarina fraseriana - Eucalyptus marginata - Corymbia calophylla - Banksia grandis* with scattered understorey, including *Adenanthos barbiger, Grevillea wilsonii* and *Leucopogon capitellatus* on sandy-gravels to gravelly soils.	565.198	5.43
	S	Open Forest of *Eucalyptus marginata - Banksia grandis – Allocasuarina fraseriana* with scattered understorey, including *Adenanthos barbiger, Leucopogon capitellatus* and *Styphelia tenuiflora* on gravels and sandy-gravels.	2661.758	25.56
	ST	Open Forest of *Eucalyptus marginata - Corymbia calophylla* with scattered understorey, including *Leucopogon capitellatus, Leucopogon verticillatus, Pteridium esculentum, Lasiopetalum floribundum* and *Styphelia tenuiflora* on sandy-gravelly soils.	388.111	3.73
	TS	Open Forest of *Eucalyptus marginata - Corymbia calophylla – Banksia grandis* with scattered understorey, including *Leucopogon verticillatus, Pteridium esculentum, Clematis pubescens* and *Bossiaea aquifolium* subsp. *aquifolium* on sandy-loam gravelly to gravelly soils.	549.993	5.28
	T	Open Forest of *Eucalyptus marginata - Corymbia calophylla* with scattered understorey, including *Leucopogon verticillatus, Pteridium esculentum, Clematis pubescens* and *Bossiaea aquifolium* subsp. *aquifolium* on sandy-loam gravelly soils.	318.305	3.06
Other Areas	CL	Cleared Areas	142.206	1.37
	Rehab	Rehabilitation Areas	1020.812	9.80
	Total		10414.527	

None of these site-vegetation types are restricted to the ONeil survey area; however all of the northern jarrah forest has not been mapped at this finer scale it is not feasible to provide a percentage representation of each site-vegetation type.

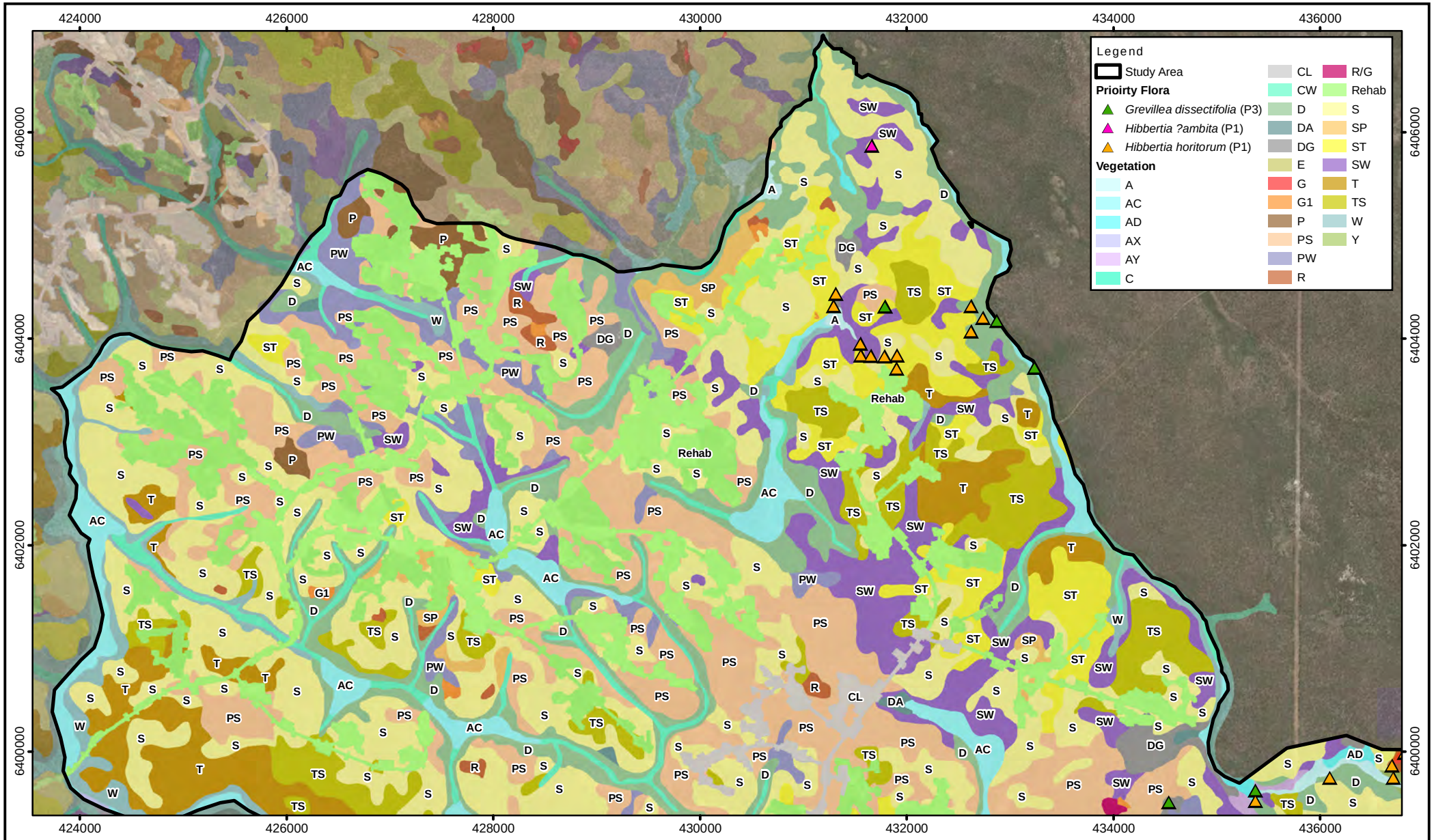
The condition of the vegetation is excellent, except for the degraded areas in the rehabilitation areas that are still regenerating and completely degraded in Cleared areas, Figure 15.

There are no threatened ecological communities (TECs) listed at Commonwealth level pursuant to sections 181 and 182 of the *EPBC Act* or listed by the DCCEEW (2024e) or at State level pursuant to Part 2 of the *BC Act* and as listed by DBCA (2023c) within the ONeil survey area.

There are no PECs listed at State level which would be likely to occur in the ONeil survey area; although further north the vegetation associated with granite outcrops has been classified as a PEC and further east and southeast the vegetation associated with granites has been classified as a PEC near Mt Saddleback (DBCA 2023b) .

At a State or National level none of the site-vegetation types have been listed as Threatened or Priority Ecological Communities.

Source:



Notes:

N

0 0.65 1.3km

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

CAD Ref: a1992_F025_20

Date: May 2024 | Rev: A | A4

Mattiske Consulting Pty Ltd
28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640
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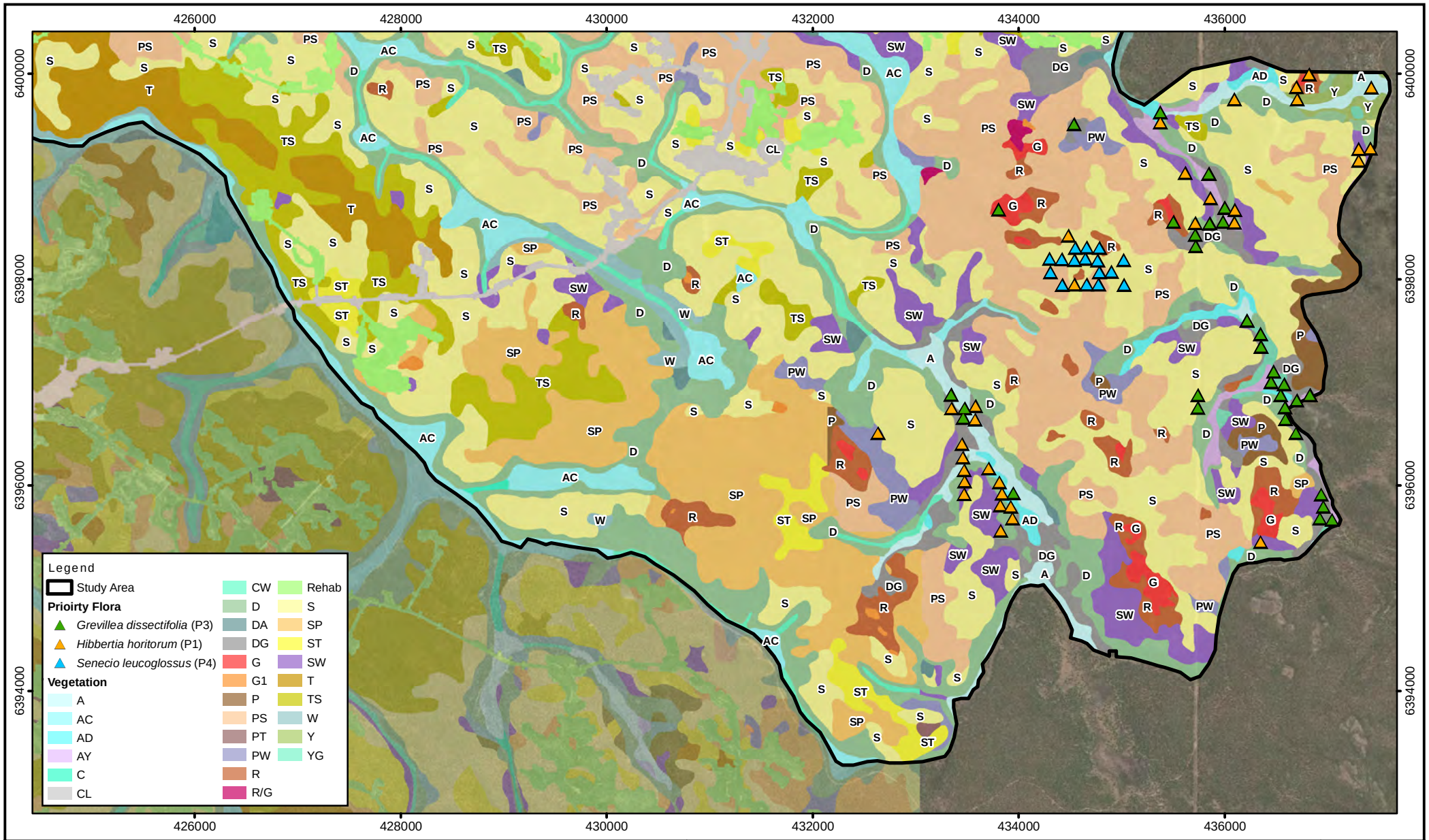
Oneil
Vegetation
Sheet 1 of 2

Figure:

14.1

Source:



Notes:

N

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

CAD Ref: a1992_F025_20

Date: May 2024 | Rev: A | A4

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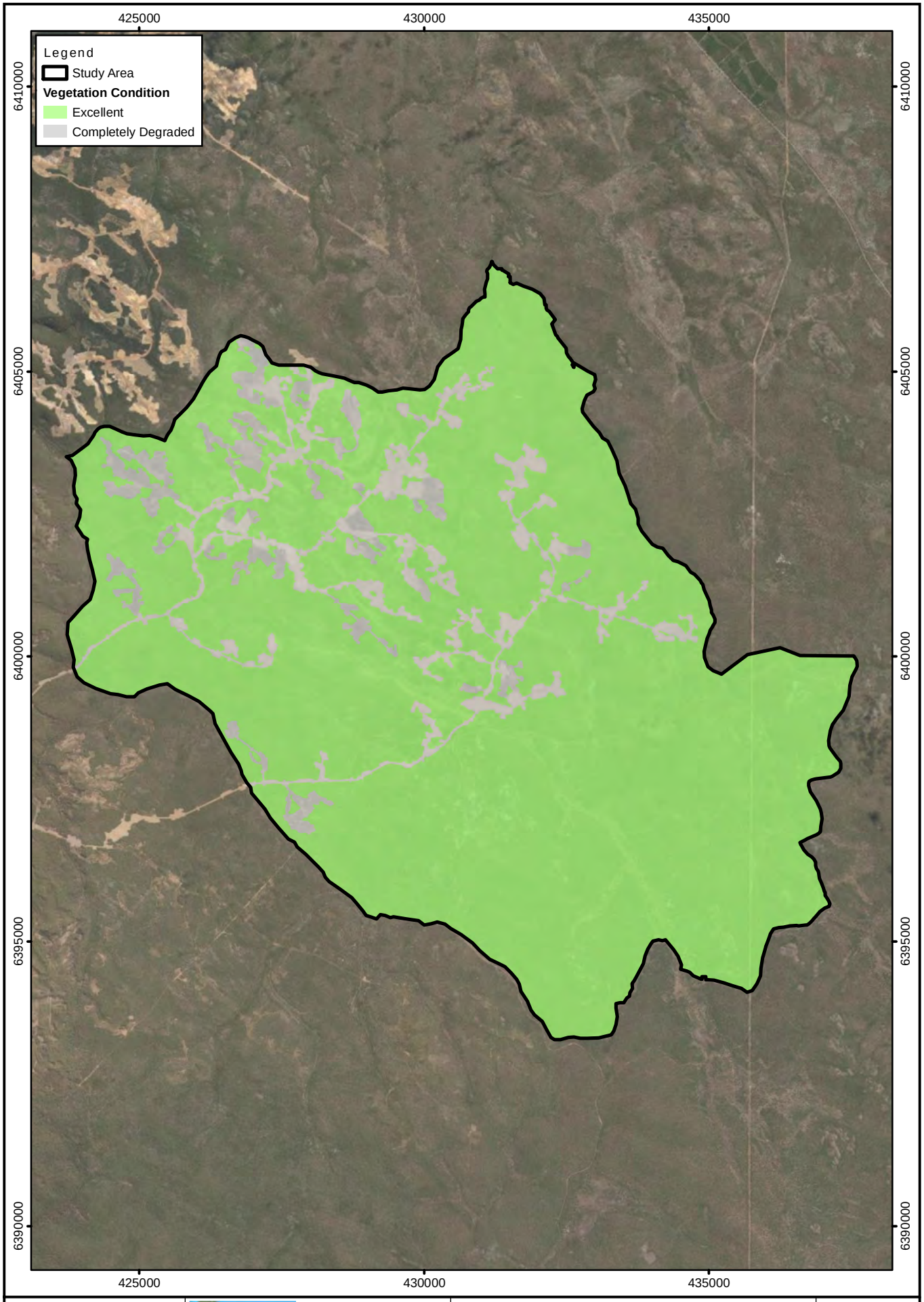
Oneil
Vegetation
Sheet 2 of 2

Figure:

14.2



N

0 0.7 1.4 km

Scale: 1:90,000
MGA94 (Zone 50)

CAD Ref: a1992_F025_18

Date: April 2024 | Rev: A | A4

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Oneil

Vegetation Condition

Figure:

15

6 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

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 ONeil 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 again in 2024 in line with some changes in nomenclature from 2022 to 2024.

The ONeil survey area lies 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 (Heddle *et al.* 1980; Mattiske and Havel (1998).

Survey Effort

The survey effort in the ONeil survey areas includes multiple survey efforts by Mattiske Consulting (2009, 2012) from the earlier flora and vegetation studies to the more recent targeted work and assessment of sites in a range of the site-vegetation types within the survey area that extend northwards and southwards from those areas previously mapped.

In summary, the work undertaken to date on the Oneil survey area supplements extensive studies previously within and adjacent to the current survey area and as such meets the EPA (2016a and 2016b) guidelines. With the proposed supplementary flora and vegetation studies in the spring months of 2024 the effort exceeds the effort undertaken on many projects as it enables a detailed and comprehensive assessment of the survey area in the local and regional context.

Recorded Flora

In the more recent targeted flora and vegetation studies a total of 353 vascular plant taxa, representative of 143 genera and 61 families were recorded in the ONeil survey area in 2024. If added to the recent work in the nearby areas between 2009 and 2024 this leads to a total of 536 vascular plant species from 182 genera and 66 families for the wider area within and near this survey area. The dominant families were Proteaceae (51 taxa), Fabaceae (45 taxa), Myrtaceae (37 taxa), Asparagaceae (18 taxa), Dilleniaceae (16 taxa), Ericaceae (16 taxa), Cyperaceae (15 taxa) and Asteraceae (15 taxa). This higher number of species appeared to be related to the wider valleys with increasing variation in soil types and the increased occurrence of shallow soils associated with the granite outcrops.

No threatened flora as listed at the Federal and State level were recorded within the ONeil survey area in 2024 (DBCA 2023a and DCCEEW 2024a).

A total of 4 priority flora species (*Hibbertia ?ambita* P1, *Hibbertia hortiorum* P1, *Grevillea dissectifolia* P3 and *Senecio leucoglossus* P4) were recorded in the ONeil survey area. The *Hibbertia hortiorum* and *Hibbertia ?ambita* occurrences appear to reflect the more easterly occurrence of these two species and in addition appears to reflect the more detailed studies of the *Hibbertia* genera by Kevin Thiele (2019). The *Grevillea dissectifolia* occurs mainly in the broader valley systems with some shallower soils and has been recorded previously to the north-east of the ONeil survey area. The *Senecio leucoglossus* occurs as scattered plants through the wider northern Jarrah forest and as such is not restricted to the ONeil area.

A total of 11 introduced species were recorded on the 2024 survey areas and some 20 species over the wider area. None of the weeds are declared pest organisms pursuant to section 22 of the BAM Act (DPIRD 2024) and none are listed as Weeds of National Significance (DCCEEW 2024d).

Recorded Vegetation

A total of 27 site-vegetation types were defined and mapped in the ONeil survey area and an additional two mapping units (CL cleared land and Rehabilitation areas). The site-vegetation types were defined on the basis of key species and site parameters as defined in Havel (1975a and 1975b) for the Jarrah forest and as refined and developed by Mattiske over the last 40 years. It is clearly apparent that there are some dominant site-vegetation types that dominate the ONeil survey area (namely P, PS, S, SP, ST, T and TS which together cover 57.41% of the survey area). A total of some 11.17% of the survey area has been either cleared or rehabilitated within the ONeil survey area.

None of these site-vegetation types are restricted to the ONeil survey area; however all of the northern jarrah forest has not been mapped at this finer scale it is not feasible to provide a percentage representation of each site-vegetation type.

The results reflect an increase in the representation of site-vegetation types associated with outcrop areas (G, G1, R/G, R, DG and YG) and also in the occurrence of a range of site-vegetation types that reflect the broader valleys and swamp areas associated with Yarragil 2 and Pindalup vegetation complexes. This shift is also apparent in several Priority species that occur north-east and east of the survey area in the broader valley systems.

There are no threatened ecological communities (TECs) listed at Commonwealth level pursuant to sections 181 and 182 of the *EPBC Act* or listed by the DCCEEW (2024e) or at State level pursuant to Part 2 of the *BC Act* and as listed by DBCA (2024b) within the ONeil survey area.

There are no priority ecological communities (PECs), as listed at State level within the ONeil survey area; although some of the values associated with the shallow soils of the granite outcrop areas have some values that overlap the PEC as defined by DBCA 2023b for the outcrop areas to the north of the survey area and the outcrop areas near Mt Saddleback.

6. ACKNOWLEDGEMENTS

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7. PERSONNEL

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

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Mr A Pereira	Experienced Botanist	Data collection and Field Studies	FB62000035-4, 145-5
Mr D Rubick	Experienced Botanist	Data collection and Field Studies	FB62000328-2,3
Ms K Tribbeck	Experienced Botanist	Data collection and Field Studies	FB62000467, 2
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R Jones	Botanist	Data collation, reporting	N/A
J Wescombe	Botanist	Data collation, 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
Ex	Extinct	Species which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	Extinct in the Wild	Species which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	Critically Endangered	Species which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	Endangered	Species which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	Vulnerable	Species which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	Conservation Dependent	Species which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

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

Threatened flora are listed in the *Wildlife Conservation (Rare Flora) Notice 2018* (under Part 2, Division 1, Subdivision 2 of the BC Act; Department of Biodiversity, Conservation and Attractions (DBCA 2024a) 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 (2024a).

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

Priority flora species are defined as "possibly threatened species that do not meet the survey criteria, or are otherwise data deficient" or species that are "adequately known, are rare but not threatened, meet criteria for near threatened or have recently been removed from the threatened species list" for other than taxonomic reasons" (DBCA 2024a). 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 (2024a).

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

APPENDIX A2: THREATENED AND PRIORITY ECOLOGICAL COMMUNITY DEFINITIONS

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

Table A2.1 Federal definition of threatened ecological communities

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

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

Threatened ecological communities (TECs) are listed in the *List of Threatened Ecological Communities endorsed by the Western Australian Minister for Environment (26 May 2023)* (under Part 2, Division 2, Subdivision 1 of the BC Act; DBCA 2023b). 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 (2023b).

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

Priority ecological communities (PECs) are defined as possible threatened ecological communities that do not meet the stringent survey criteria for the assessment of threatened ecological communities, and are listed by the DBCA (2023a) in the *Priority Ecological Communities for Western Australia – Version 35 (19 June 2023)*. 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 (2023a).

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

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

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

Under the *Biosecurity and Agriculture Management Regulations 2013* (WA), declared pest plants are placed in one of three control categories, C1 (exclusion), C2 (eradication) or C3 (management), which determines the measures of control which apply to the declared pest (Table A4.1). The current listing of declared pest organisms and their control category is through the Western Australian Organism List (Department of Primary Industries and Regional Development 2024).

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

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

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

APPENDIX A4: OTHER DEFINITIONS

Environmentally sensitive areas

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

Conservation significant flora

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

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

Conservation significant vegetation

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

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

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

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

Table A5.1 Definition of vegetation condition categories

Note: Adapted from Keighery (1994).

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

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN ONEIL SURVEY AREAS

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

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Anthocercis gracilis	Solanaceae	T	Vulnerable	Habit: Erect, spindly shrub, to 0.6 (-1) m high. Flower colour: yellow-green Flowering period (indicated in green): J F M A M J J A **S** **O** N D Soils: Sandy or loamy soils. Granite outcrops. IBRA Distribution: AVW, JAF Florabase records: 30	Very Low On eastern and western fringes of northern Jarrah forest
Banksia mimica	Proteaceae	T	Endangered	Habit: Prostrate, lignotuberous shrub, 0.15-0.4 m high. Flower colour: yellow-brown Flowering period (indicated in green): J F M A M J J A **S** **O** N D Soils: White or grey sand over laterite, sandy loam. IBRA Distribution: JAF, SWA Florabase records: 40	Very Low Occurs to the north on the SWA and south JAF
Caladenia huegelii	Orchidaceae	T	Endangered	Habit: Tuberous, perennial, herb, 0.25-0.6 m high. Flower colour: green & cream & red Flowering period (indicated in green): J F M A M J J A **S** **O** N D Soils: Grey or brown sand, clay loam. IBRA Distribution: JAF, SCP Florabase records: 43	Very Low Location outside species known range. Species not known within central part of northern Jarrah forest.
Diuris drummondii	Orchidaceae	T	Vulnerable	Habit: Tuberous, perennial, herb, 0.5-1.05 m high. Flower colour: yellow Flowering period (indicated in green): **J** F M A M J J A S O **N** **D** Soils: Low-lying depressions, swamps IBRA Distribution: AVW, JAF, SWA, WAR Florabase records: 55	Very Low Dependent on suitable low-lying depressions/habitat conditions.

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN ONEIL SURVEY AREAS

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

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Diuris micrantha	Orchidaceae	T	Vulnerable	Habit: Tuberous, perennial, herb, 0.3-0.6 m high. Flower colour: yellow & brown Flowering period (indicated in green): J F M A M J J A **S** **O** N D Soils: Brown loamy clay. Winter-wet swamps, in shallow water. IBRA Distribution: JAF, SWA Florabase records: 9	Very Low Dependent on suitable depressions/habitat conditions.
Diuris purdiei	Orchidaceae	T	Endangered	Habit: Tuberous, perennial, herb, 0.15-0.35 m high. Flower colour: yellow Flowering period (indicated in green): only after a summer or early autumn fire J F M A M J J A **S** **O** N D Soils: Grey-black sand, moist. Winter-wet swamps. IBRA Distribution: JAF, SWA Florabase records: 26	Very Low Dependent on suitable swamps/habitat conditions.
Drakaea micrantha	Orchidaceae	T	Vulnerable	Habit: Tuberous, perennial, herb, 0.15-0.3 m high. Flower colour: red & yellow Flowering period (indicated in green): J F M A M J J A **S** **O** N D Soils: White-grey sand. IBRA Distribution: JAF, SWA, WAR Florabase records: 50	Very Low Outside species range. Species not known within the Northern Jarrah Forest.

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN ONEIL SURVEY AREAS

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

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Eleocharis keigheryi	Cyperaceae	T	Vulnerable	Habit: Rhizomatous, clumped perennial, grass-like or herb (sedge), to 0.4 m high. Flower colour: green Flowering period (indicated in green): J F M A M J J **A S O N** D Soils: Clay, sandy loam. Emergent in freshwater: creeks, claypans. IBRA Distribution: AVW, GES, JAF, SWA Florabase records: 59	Very Low Not recorded within proximity. Dependent on appropriate hydrology on site.
Lasiopetalum pterocarpum	Malvaceae	T	Endangered	Habit: Open, multi-stemmed shrub (with distinctly winged fruit), to 1.2 m high. Flower colour: pink Flowering period (indicated in green): J F M A M J J **A S O N D** Soils: Dark red-brown loam or clayey sand over granite. On sloping banks near creeklines. IBRA Distribution: JAF Florabase records: 11	Very Low Restricted to creeklines near Darling Scarp.
Morelotia australiensis	Cyperaceae	T	Vulnerable	Habit: Rhizomatous, tufted perennial, grass-like or herb (sedge), to 1 m high. Flower colour: brown Flowering period (indicated in green): J F M A M J J A S O **N D** Soils: Sand, sandy loam. Flats, well-drained areas. IBRA Distribution: JAF, SWA Florabase records: 49	Very Low North of survey area near Darling Scarp

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN ONEIL SURVEY AREAS

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

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Thelymitra stellata	Orchidaceae	T	Endangered	Habit: Tuberous, perennial, herb, 0.15-0.25 m high. Flower colour: yellow & brown Flowering period (indicated in green): J F M A M J J A S **O N** D Soils: Sand, gravel, lateritic loam. IBRA Distribution: GES, JAF, SWA Florabase records: 20	Very Low Spread between Three Springs and Pinjarra.
Verticordia fimbrilepis subsp. *fimbrilepis*	Myrtaceae	T	Endangered	Habit: Shrub, 0.3-0.7 m high. Flower colour: pink-white Flowering period (indicated in green): **J** F M A M J J A S **O N D** Soils: Gravelly or clayey soils. Flats, road verges. IBRA Distribution: AVW, JAF Florabase records: 39	Very Low Species habitat within north-eastern extent of JAF and AVW (EPBC Conservation Advice, 2021)
Darwinia hortiorum	Myrtaceae	P1	-	Habit: Low spreading shrub, 10-25cm Flower colour: green-cream Flowering period (indicated in green): J F M A M J J **A S O N D** Soils: Loam soils over laterite or granite slopes associated with outcrops IBRA Distribution: JAF Florabase records: 9	Medium Species habitat within north-eastern extent of JAF
Hibbertia acrotoma	Dilleniaceae	P1	-	Habit: Openly branched, spreading to prostrate shrub to 0.5m. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A S** O N D Soils: Loam soils over laterite or granite IBRA Distribution: JAF, SWA Florabase records: 7	Very Low Edge of Darling Scarp between Serpentine & Oakley Dam

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN ONEIL SURVEY AREAS

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

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Hibberta hortiorum	Dilleniaceae	P1	-	Habit: Mat-forming shrubs to 0.1m high or less. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: Laterite IBRA Distribution: JAF Florabase records: 12	High Species known from mainly north-eastern areas of northern Jarrah forest
Paracaleana granitica	Orchidaceae	P1	-	Habit: Perennial, herb, to 0.07 m high. Flower colour: green-purple Flowering period (indicated in green): J F M A M J J A S **O N D** Soils: Growing on moss mats, granite. Outcrops. IBRA Distribution: JAF Florabase records: 7	Low Mainly north of survey area and more common on north-eastern section of northern Jarrah forest
Banksia recurvistylis	Proteaceae	P2	-	Habit: Shrub, spreading, 2m to 3m wide and 1.5m high Flower colour: yellow Flowering period (indicated in green): **J** F M A M J J A S O **N D** Soils: In cracks in granite outcrops, brown clays, sand and gravel with lateritic boulders IBRA Distribution: JAF Florabase records: 7	Medium Mainly north of survey area and more common on north-eastern section of northern Jarrah forest
Bossiaea modesta	Fabaceae	P2	-	Habit: Slender, trailing and twining shrub. Flower colour: yellow/red Flowering period (indicated in green): J F M A M J J A S **O N D** Soils: On soils derived from granite IBRA Distribution: JAF Florabase records: 22	Low-Moderate Mainly north of survey area, although been recorded west of survey area in the northern Jarrah forest

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN ONEIL SURVEY AREAS

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

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Calectasia grandiflora	Dasypogonaceae	P2	-	Habit: Rhizomatous, perennial, herb (or undershrub), to 0.65 m high, without stilt roots. Flower colour: blue/purple Flowering period (indicated in green): J F M A M **J J A S O N** D Soils: On soils derived from granite. Damp areas close to streams. IBRA Distribution: JAF, SWA, AVW Florabase records: 12	Very Low Species not known in the area near the survey area, mainly near the Darling Scarp and Perth
Grevillea ornithopoda	Proteaceae	P2	-	Habit: Spreading, virgate shrub, 1-3 (-5) m high, up to 3 m wide. Flower colour: cream-white Flowering period (indicated in green): J F M A **M J J A S O N** D Soils: Loam, loam over clay, sand, clay. Edge of river bank and creek, dunes IBRA Distribution: JAF, SWA Florabase records: 20	Low Moderate Within species range, recorded south, west and north of survey area.
Tetratheca phoenix	Elaeocarpaceae	P2	-	Habit: Few-branched shrub (subshrub), to 0.25 m high. Flower colour: dark pink-magenta Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: Brown gravelly loam over granite. Mid to Upper slopes, near granite outcrops. IBRA Distribution: JAF Florabase records: 10	High Within species range. Recorded near survey area

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN ONEIL SURVEY AREAS

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

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Acacia drummondii subsp. *affinis*	Fabaceae	P3	-	Habit: Erect shrub, 0.3-1 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J **J** **A** S O N D Soils: Lateritic gravelly soils. IBRA Distribution: AVW, JAF, SWA Florabase records: 37	Very Low Mainly north-east of Perth in northern forests
Acacia horridula	Fabaceae	P3	-	Habit: Harsh, slender, single-stemmed shrub, 0.3-0.6 (-1) m high. Flower colour: yellow Flowering period (indicated in green): J F M A **M** **J** **J** **A** S O N D Soils: Gravelly soils over granite, sand. Rocky hillslopes. IBRA Distribution: JAF, SWA Florabase records: 33	Low-Moderate Mainly north of survey area and on Darling Scarp
Acacia oncinophylla subsp. *oncinophylla*	Fabaceae	P3	-	Habit: Shrub, 0.9-2.5 m high, 'minni-ritchi' bark, phyllodes mostly 8-13 cm long, 1-2 mm wide. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A** **S** **O** N D Soils: Granitic soils IBRA Distribution: AVW, JAF, SWA Florabase records: 42	Low-Moderate Within species range but associated with granitic soils.

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN ONEIL SURVEY AREAS

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

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Adenanthos cygnorum subsp. *chamaephyton*	Proteaceae	P3	-	Habit: Prostrate, mat-forming, non-lignotuberous shrub, to 0.3 m high. Flower colour: white-cream-pink-green/green Flowering period (indicated in green): **J F** M A M J **J A S O N D** Soils: Grey sand, lateritic gravel. IBRA Distribution: AVW, JAF, SWA Florabase records: 22	Moderate Within species range. Recorded at O'Neil (MCPL 2009)
Andersonia sp. Audax (F. Hort, B. Hort & J. Hort 3179)	Ericaceae	P3	-	Habit: Shrub, to 1.1 m high and 1.1 m wide. Flower colour: white-cream/mauve-pink Flowering period (indicated in green): J F M A M J J A S **O N** D Soils: Loam, clay, sand, gravel. Granite, slopes and drainage lines. IBRA Distribution: JAF Florabase records: 23	Moderate Within species range, mainly to the north and north-east of survey area.
Conospermum scaposum	Proteaceae	P3	-	Habit: Erect shrub, 0.2-0.45(-0.75) m high. Flower colour: blue Flowering period (indicated in green): **J F** M A M J J A S **O N D** Soils: White-grey sand, sandy clay. Low swampy areas, road verges. IBRA Distribution: AVW, GES, JAF, SWA Florabase records: 47	Low-Moderate Species recorded at Myara North (MCPL 2019/20); however mainly north-east of Jarrah forest

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN ONEIL SURVEY AREAS

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

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Cyathochaeta teretifolia	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	Moderate Dependent on habitat hydrology requirements on-site.
Grevillea dissectifolia (formerly known as *Grevillea manglesii* subsp. *dissectifolia)*	Proteaceae	P3	-	Habit: Erect shrub, 1-2.5m high. Flower colour: white-pink Flowering period (indicated in green): J F M A M **J** **J** **A** **S** **O** N D Soils: Sands, loam and laterite and near lateritic boulders IBRA Distribution: JAF Florabase records: 24	High Species records nearby and mainly north to north-east of survey area.
Hakea oldfieldii	Proteaceae	P3	-	Habit: Open straggling shrub up to 2.5m. Flower colour: white-cream to yellow Flowering period (indicated in green): J F M A M J J **A** **S** **O** N D Soils: Red clay or sand over laterite, seasonally wet flats IBRA Distribution: GES, SWA, AVW, JAF. MAL, ESP Florabase records: 66	Low Soil conditions less likely in survey area and occurs mainly south, southeast and east of survey area
Halgania corymbosa	Boraginaceae	P3	-	Habit: Erect shrub, 0.35-1 m high. Flower colour: blue-purple Flowering period (indicated in green): J F M A M J J **A** **S** **O** **N** D Soils: Gravelly soils, soils over granite. IBRA Distribution: JAF, SWA Florabase records: 18	Very Low Species records to the west of the Darling Scarp and either north or east of survey area.

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN ONEIL SURVEY AREAS

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

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Hemigenia microphylla	Lamiaceae	P3	-	Habit: Slender shrub, 0.4-1.8 m high. Flower colour: blue-purple Flowering period (indicated in green): J F M A M J J A **S O N D** Soils: Sandy-clay, peaty clay, granite and winter wet depressions. IBRA Distribution: JAF, SWA, WAR Florabase records: 26	Low - Moderate Mainly west and south, although localised occurrence south of survey area.
Isopogon autumnalis	Proteaceae	P3	-	Habit: Shrub 0.5-1 m high. Flower colour: cream, yellow Flowering period (indicated in green): **J F M A M J** J A S O N D Soils: Sandy soils. IBRA Distribution: GES, JAF, SWA Florabase records: 59	Very Low Records to the west of the Darling Scarp.
Lasiopetalum glutinosum subsp. *glutinosum*	Malvaceae	P3	-	Habit: Shrub to 0.8 m high. Flower colour: pink-purple Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: Lateritic gravel and clay, clay loam, sandy clay over granite. Slopes, granite outcrops. IBRA Distribution: AVW, JAF, SWA Florabase records: 48	Very Low Records mainly north or west near Darling Scarp.

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN ONEIL SURVEY AREAS

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

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Lepyrodia heleocharoides	Restionaceae	P3	-	Habit: Rhizomatous, slender, tufted perennial, herb (sedge-like), 0.15-0.25 m high. Flower colour: - Flowering period (indicated in green): J F M A M J J A S O N **D** Soils: Moist peaty sand. Dry or seasonally inundated heath or woodland, swamps. IBRA Distribution: JAF, SWA Florabase records: 20	Very Low Mainly west of in southern forested areas
Meionectes tenuifolia	Haloragaceae	P3	-	Habit: Annual semi-aquatic herb, to 0.35 m high. Flower colour: orange-red-brown, green Flowering period (indicated in green): J F M A M J J A **S O N D** Soils: Grey sand or grey-brown clay, shallow soils. Seasonally inundated flat, edge of swamp. IBRA Distribution: JAF, SWA Florabase records: 27	Low Dependent on suitable habitat.
Stackhousia sp. Red-blotched corolla (A. Markey 911)	Celastraceae	P3	-	Habit: Erect herb or shrub, approximately 0.2 m high. Flower colour: cream-yellow Flowering period (indicated in green): J F M A M J J A **S O N** D Soils: Brown loamy sand, clayey sand over laterite, white sandy clay over granite, grey clay. Slopes. IBRA Distribution: AVW, GES, JAF Florabase records: 9	Very Low Mainly west and north of survey area.

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN ONEIL SURVEY AREAS

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

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Thysanotus anceps	Asparagaceae	P3	-	Habit: Rhizomatous, leafless perennial, herb, to 0.4 m high. Flower colour: purple Flowering period (indicated in green): J F M A M J J A S **O N D** Soils: White or grey sand, lateritic gravel, laterite. IBRA Distribution: GES, JAF, SWA Florabase records: 17	Moderate Recorded west of survey area.
Acacia oncinophylla subsp. patulifolia	Fabaceae	P4	-	Habit: Shrub, 0.5-2.5(-3) m high, 'minni-ritchi' bark, phyllodes 4-9 cm long, 3-6 mm wide. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A S O N D** Soils: Granitic soils, occasionally on laterite. IBRA Distribution: JAF, SWA Florabase records: 31	Low-Moderate Recorded mainly to north and north-west.
Aponogeton hexatepalus	Aponogetonceae	P4	-	Habit: Rhizomatous or cormous, aquatic perennial, herb, leaves floating. Flower colour: green-white Flowering period (indicated in green): J F M A M J **J A S O** N D Soils: Mud. Freshwater: ponds, rivers, claypans. IBRA Distribution: JAF, SWA Florabase records: 30	Very Low Mainly on Swan Coastal Plain and southern forests.
Calothamnus graniticus subsp. *leptophyllus*	Myrtaceae	P4	-	Habit: Erect, multi-stemmed shrub, 1-2 m high. Flower colour: red Flowering period (indicated in green): J F M A M **J J A** S O N D Soils: Clay over granite, lateritic soils. Hillsides. IBRA Distribution: JAF, SWA Florabase records: 32	Low Nearby records within SWA and then occurs of survey area.

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN ONEIL SURVEY AREAS

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

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Cyanothamnus tenuis	Rutaceae	P4	-	Habit: Procumbent or erect & slender shrub, 0.1-0.5 m high. Flower colour: blue/pink-white Flowering period (indicated in green): J F M A M J J **A S O N** D Soils: Laterite, stony soils, granite. IBRA Distribution: JAF, SWA Florabase records: 45	Low Mainly west on coastal plain and then on eastern fringes of Jarrah forest.
Drosera occidentalis	Droseraceae	P4	-	Habit: Fibrous-rooted, rosetted perennial, herb, to 0.025 m high. Flower colour: pink/white Flowering period (indicated in green): **J** F M A M J J A S **O N D** Soils: White/black sand over yellow clay, yellow sand, moist brown/grey clay/sand, peaty sand, sandy clay. Damp flats, flood plain. IBRA Distribution: JAF, SWA Florabase records: 23	Moderate-High Nearby records within coastal plain and on eastern area of Jarrah forest.
Grevillea pimeleoides	Proteaceae	P4	-	Habit: Non-lignotuberous shrub, 0.4-2.4 m high. Flower colour: yellow-orange Flowering period (indicated in green): J F M A **M J J A S O N** D Soils: Gravelly soils over granite. Rocky hillsides. IBRA Distribution: JAF Florabase records: 36	Low Species recorded mainly to north of survey area and then localised site near Albany.

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN ONEIL SURVEY AREAS

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

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Parsonsia diaphanophleba	Apocynaceae	P4	-	Habit: Woody climber, to 10 m high. Flower colour: white/cream & pink Flowering period (indicated in green): **J F** M **A M J** J A **S** O N D Soils: Alluvial soils. Along rivers. IBRA Distribution: JAF, SWA Florabase records: 28	Very Low Species occurs on alluvial soils along rivers; mainly on coastal plain and south of survey area.
Pimelea rara	Thymelaeaceae	P4	-	Habit: Shrub, 0.2-0.35 m high. Flower colour: white Flowering period (indicated in green): **J** F M A M J J A S O N **D** Soils: Lateritic soils. IBRA Distribution: JAF Florabase records: 52	High Species recorded near survey area.
Senecio leucoglossus	Asteraceae	P4	-	Habit: Erect annual, herb, to 1.3 m high. Flower colour: white Flowering period (indicated in green): J F M A M J J **A S O N D** Soils: Gravelly lateritic or granitic soils. Granite outcrops, slopes. IBRA Distribution: JAF, SWA, WAR Florabase records: 45	High Species recorded near and within survey area.
Stylidium ireneae	Stylidiaceae	P4	-	Habit: Lax perennial, herb, (0.06-) 0.1-0.28 m high. Flower colour: pink Flowering period (indicated in green): J F M A M J J A S **O N D** Soils: Sandy loam. Valleys near creek lines. IBRA Distribution: JAF, SWA, WAR Florabase records: 30	High Species recorded near survey area.

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN ONEIL SURVEY AREAS

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

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Verticordia lindleyi subsp. *lindleyi*	Myrtaceae	P4	-	Habit: Erect shrub, 0.2-0.75 m high. Flower colour: pink Flowering period (indicated in green): J F M A M J J A S O N D Soils: Sand, sandy clay. Winter-wet depressions. IBRA Distribution: GES, JAF, SWA Florabase records: 83	Very Low Nearby records within SWA. Grows on sand, sandy clay.

APPENDIX C: VASCULAR PLANT SPECIES NEAR AND WITHIN THE ONEIL SURVEY AREAS, 1998 TO 2024

Note: *Denotes introduced species; P1 and P4 denote Priority Flora Species (DBCA 2401)

Family		Species	1998	2009	2023	2024
Amaranthaceae		*Ptilotus drummondii*		x		x
		Ptilotus drummondii var. *drummondii*		x		
		Ptilotus manglesii	x	x	x	x
		Ptilotus sp.				x
Anarthriaceae		*Lyginia barbata*		x		x
		Lyginia imberdis		x		
Apiaceae		*Pentapeltis peltigera*	x	x	x	x
		Platysace compressa	x		x	x
		Platysace filoformis		x		x
		Platysace tenuissima	x	x		x
		Platysace sp.			x	x
		Xanthosia atkinsoniana	x	x	x	x
		Xanthosia candida	x	x	x	x
		Xanthosia ciliata		x		
		Xanthosia huegelii	x	x		x
		Xanthosia singuliflora		x	x	x
		Apiaceae sp.			x	
Araliaceae		*Trachymene pilosa*		x	x	x
Asparagaceae		*Dichopogon capillipes*				x
		Lomandra brttanii	x	x		
		Lomandra caespitosa	x	x	x	x
		Lomandra drummondii		x		
		Lomandra hermaphrodita	x	x	x	x
		Lomandra integra	x	x		
		Lomandra micrantha	x	x	x	x
		Lomandra micrantha subsp. micrantha		x		
		Lomandra nigricans		x	x	x
		Lomandra odora		x		
		Lomandra preissii	x	x		x
		Lomandra purpurea	x			x
		Lomandra sericea	x	x	x	x
		Lomandra sonderi	x	x	x	x
		Lomandra spartea	x	x	x	x
		Lomandra sp.		x	x	x
		Sowerbaea laxiflora	x			
		Thysanotus arenarius		x		
		Thysanotus dichotomus	x	x		x
		Thysanotus fastigiatus	x	x		x
		Thysanotus manglesianus		x		x
		Thysanotus sparteus		x		x
		Thysanotus tenellus		x		
		Thysanotus multiflorus	x	x	x	x
		Thysanotus thyrsoideus	x	x	x	x
		Thysanotus sp.		x	x	x
Asteraceae	*	*Conyza sumatrensis*	x			
		Craspedia variabilis	x	x		
		Helichrysum luteoalbum		x		
		Hyalosperma cotula		x		x
	*	*Hypochaeris glabra*	x	x	x	x
		Lagenophora huegelii	x	x	x	x
		Millotia tenuifolia		x		

APPENDIX C: VASCULAR PLANT SPECIES NEAR AND WITHIN THE ONEIL SURVEY AREAS, 1998 TO 2024

Note: *Denotes introduced species; P1 and P4 denote Priority Flora Species (DBCA 2401)

Family		Species	1998	2009	2023	2024
Asteraceae		*Ozothamnus cordatus*	x			
(continued)		*Podolepis lessonii*		x		
	*	*Pseudognaphalium luteoalbum*				x
		Pterochaeta paniculata		x		x
		Senecio diaschides	x	x		x
		Senecio hispidulus	x	x	x	x
		Senecio hispidulus var. hispidulus		x		
	P4	*Senecio leucoglossus*	x	x	x	x
		Senecio quadridentatus		x		x
	*	*Senecio vulgaris*		x		
		Senecio sp.		x		x
	*	*Sonchus asper*		x		
	*	*Sonchus* sp.				x
		Siloxerus humifusus		x		
		Trichocline spathulata	x	x	x	x
	*	*Ursinia anthemoides*		x		x
		Waitzia acuminata		x		
		Waitzia suaveolens				x
		Waitzia suaveolens var. suaveolens		x		
		Asteraceae sp.		x		x
Boryaceae		*Borya sphaerocephala*				x
Campanulaceae		*Isotoma hypocrateriformis*		x		
		Lobelia gibbosa		x		x
		Lobelia heterophylla		x		x
		Lobelia rhombifolia		x		
		Lobelia sp.				x
	*	*Wahlenbergia capensis*		x		x
Caryophyllaceae	*	*Petrorhagia dubia*				x
		Caryophyllaceae sp.		x		
Casuarinaceae		*Allocasuarina fraseriana*	x	x	x	x
		Allocasuarina humilis	x	x		x
Centrolepidaceae		*Centrolepis aristata*				x
Colchicaceae		*Burchardia congesta*		x	x	x
Cupressaceae		*Callitris* sp.				x
Cyperaceae		*Baumea vaginalis*		x		
		Cyathochaeta avenacea	x	x		x
		Gahnia decomposita		x	x	x
		Gahnia trifida	x	x		
		Lepidosperma brunonianum		x		
		Lepidosperma drummondii				x
		Lepidosperma gladiatum		x		
		Lepidosperma gracile				x
		Lepidosperma leptostachyum		x		
		Lepidosperma longitudinale		x		x
		Lepidosperma pubisquameum	x	x		x
		Lepidosperma squamatum	x	x		x
		Lepidosperma tenue	x	x		x
		Lepidosperma tetraquetrum		x	x	x

APPENDIX C: VASCULAR PLANT SPECIES NEAR AND WITHIN THE ONEIL SURVEY AREAS, 1998 TO 2024

Note: *Denotes introduced species; P1 and P4 denote Priority Flora Species (DBCA 2401)

Family		Species	1998	2009	2023	2024
Cyperaceae		*Lepidosperma tuberculatum*		x		x
(continued)		*Lepidosperma* sp.		x	x	x
		Mesomelaena ?graciliceps		x		
		Mesomelaena tetragona	x	x		
		Morelotia octandra	x	x		x
		Netrostylis sp. Jarrah Forest (R. Davis 7391)	x	x	x	x
		Schoenus brevisetis		x		
		Schoenus clandestinus		x		
		Schoenus sp.		x		x
		Cyperaceae sp.			x	
Dasypogonaceae		*Kingia australis*		x		
Dennstaedtiaceae		*Pteridium esculentum*	x	x	x	x
Dilleniaceae		*Hibbertia acerosa*	x	x	x	x
	P1	*Hibbertoa ?ambita*				x
		Hibbertia amplexicaulis	x	x	x	x
		Hibbertia commutata	x	x	x	x
		Hibbertia commutata (hairy)		x		
		Hibbertia diamesogenos		x		
		Hibbertia glomerata subsp. *glomerata*				x
		Hibbertia gracilipes	x			
	P1	*Hibbertia hortiorum*			x	x
		Hibbertia huegelii		x		x
		Hibbertia hypericoides		x		x
		Hibbertia inconspicua	x			
		Hibbertia lasiopus	x	x		x
		Hibbertia lasiopus/quadricolor	x			
		Hibbertia microphylla				x
		Hibbertia ovata		x	x	x
		Hibbertia pachyrrhiza		x		
		Hibbertia perfoliata	x	x	x	x
		Hibbertia pilosa		x		x
		Hibbertia prolata				x
		Hibbertia quadricolor		x		
		Hibbertia rhadinopoda	x			
		Hibbertia silvestris		x		x
		Hibbertia stellaris	x	x		
		Hibbertia sp.			x	x
Droseraceae		*Drosera erythrorhiza*	x	x		
		Drosera platystigma		x		
		Drosera sp.		x	x	x
		Drosera sp. Climbing			x	x
Elaeocarpaceae		*Platytheca galioides*		x		
Ericaceae		*Andersonia aristata*				x
		Andersonia caerulea		x		
		Andersonia lehmanniana				x
		Andersonia sp.				x
		Leucopogon australis	x	x		x
		Leucopogon capitellatus	x	x	x	x
		Leucopogon glabellus		x		
		Leucopogon pulchellus		x		

APPENDIX C: VASCULAR PLANT SPECIES NEAR AND WITHIN THE ONEIL SURVEY AREAS, 1998 TO 2024

Note: *Denotes introduced species; P1 and P4 denote Priority Flora Species (DBCA 2401)

Family		Species	1998	2009	2023	2024
Ericaceae		*Leucopogon verticillatus*	x	x	x	x
(continued)		*Leucopogon* sp. Boddington (D. Halford 80746)				x
		Leucopogon sp.		x		x
		Styphelia conostephioides		x		
		Styphelia discolor	x	x	x	x
		Styphelia erectifolia		x		x
		Styphelia nitens	x	x	x	x
		Styphelia pallida	x	x	x	x
		Styphelia propinqua	x	x	x	x
		Styphelia pubescens				x
		Styphelia tenuiflora	x	x	x	x
		Styphelia sp.				x
		Ericaceae sp.			x	
Euphorbiaceae		*Monotaxis gracilis*	x			
		Monotaxis grandiflora		x		
		Monotaxis grandiflora var. *grandiflora*		x		
		Monotaxis occidentalis	x	x	x	x
		Stachystemon vermicularis		x		
Fabaceae		*Acacia alata*	x	x	x	x
		Acacia applanata	x			x
		Acacia barbinervis		x		
		Acacia browniana	x		x	x
		Acacia celstrifolia		x		
		Acacia divergens	x	x	x	
		Acacia drummondii subsp. candolleana	x	x		
		Acacia drummondii subsp. drummondii	x	x	x	x
	*	*Acacia elata*		x		
		Acacia ephedroides				x
		Acacia extensa	x	x		x
		Acacia incurva	x	x		
		Acacia lateriticola		x	x	x
		Acacia nervosa	x	x		x
		Acacia obovata		x		
		Acacia preissiana	x			x
		Acacia pulchella	x	x		x
		Acacia pulchella var. glaberrima		x		
		Acacia saligna	x			x
		Acacia stenoptera		x		x
		Acacia urophylla	x	x		x
		Acacia varia		x		
		Acacia willdenowniana	x	x		x
		Acacia sp.		x		x
		Aotus cordifolia P3		x		
		Bossiaea aquifolium	x	x	x	x
		Bossiaea ornata	x	x	x	x
		Callistachys lanceolata		x		
		Chorizema cordatum		x		x
		Chorizema dicksonii	x			x
		Chorizema rhombeum	x	x		
		Daviesia decurrens	x	x		x
		Daviesia divaricata				x
		Daviesia horrida	x	x		x
		Daviesia incrassata	x	x		x
		Daviesia inflata		x		

APPENDIX C: VASCULAR PLANT SPECIES NEAR AND WITHIN THE ONEIL SURVEY AREAS, 1998 TO 2024

Note: *Denotes introduced species; P1 and P4 denote Priority Flora Species (DBCA 2401)

Family		Species	1998	2009	2023	2024
Fabaceae		*Daviesia longifolia*		x		
(continued)		*Daviesia physodes*	x	x		x
		Daviesia preissii	x	x		x
		Daviesia rhombifolia	x	x		x
		Eutaxia parvifolia		x		
		Eutaxia virgata		x		
		Gastrolobium calycinum		x		x
		Gastrolobium ebracteolatum			x	
		Gastrolobium spinosum	x	x		x
		Gompholobium capitatum	x	x		
		Gompholobium confertum	x			
		Gompholbium cyaninum		x		x
		Gompholobium knightianum	x	x		x
		Gompholobium marginatum	x	x	x	x
		Gompholobium polymorphum	x	x	x	x
		Gompholobium preissii	x	x	x	
		Gompholobium preissii		x		x
		Gompholobium tomentosum		x		x
		Gompholobium venustum		x		
		Gompholobium sp.		x		
		Hardenbergia comptoniana		x		
		Hovea chorizemifolia	x	x		x
		Hovea trisperma		x	x	
		Jacksonia furcellata		x		x
		Jacksonia horrida		x		
		Kennedia coccinea	x	x		x
		Kennedia prostrata	x	x	x	x
		Labichea punctata	x			x
		Mirbelia dilatata	x	x		x
		Mirbelia spinosa	x			
		Sphaerolobium linophyllum				x
		Sphaerolobium medium	x	x		x
		Sphaerolobium vimineum		x		
		Sphaerolobium sp.				x
		Templetonia drummondii				x
	*	*Trifolium* sp.		x		
		Fabaceae sp.				x
Gentianaceae	*	*Centaurium erythraea*				
Goodeniaceae		*Dampiera alata*	x	x		x
		Dampiera linearis	x	x	x	x
		Lechenaultia biloba	x	x	x	x
		Scaevola calliptera	x	x	x	x
		Scaevola pilosa	x	x		
		Scaevola sp.				x
Haemodoraceae		*Anigozanthos humilis*				x
		Anigozanthos manglesii		x		x
		Conostylis aculeata	x			
		Conostylis aculeata subsp. *aculeata*				x
		Conostylis pusilla				x
		Conostylis serrulata	x	x	x	x
		Conostylis setigera	x	x		x
		Conostylis setigera subsp. *setigera*	x	x		
		Conostylis setosa	x	x	x	x

APPENDIX C: VASCULAR PLANT SPECIES NEAR AND WITHIN THE ONEIL SURVEY AREAS, 1998 TO 2024

Note: *Denotes introduced species; P1 and P4 denote Priority Flora Species (DBCA 2401)

Family		Species	1998	2009	2023	2024
Haemodoraceae		*Conostylis sp.*		x		x
(continued)		*Haemodorum discolor*		x		
		Haemodorum ?simplex		x		
		Haemodorum sp.		x	x	
		Haemodoraceae sp.		x	x	x
Haloragaceae		*Glischrocaryon aureum*	x	x		x
		Gonocarpus benthamii				x
		Gonocarpus cordiger	x	x		
		Gonocarpus sp.		x		
Hemerocallidaceae		*Agrostocrinum hirsutum*		x		
		Agrostocrinum scabrum	x			
		Chamaescilla corymbosa	x	x	x	
		Dianella revoluta				x
		Dianella revoluta var. divaricata	x	x		
		Tricoryne elatior	x	x		x
		Tricoryne humilis		x		x
		Tricoryne sp.				x
Hypericaceae	*	*Hypericum perforatum*		x		x
Iridaceae		*Patersonia babianoides*	x	x		
		Patersonia juncea		x		
		Patersonia occidentalis	x	x	x	x
		Patersonia pygmaea	x	x	x	x
		Patersonia rudis	x	x		x
		Patersonia rudis subsp. *rudis*		x		
		Patersonia sp.				x
Lamiaceae		*Hemiandra pungens*		x		x
		Hemigenia incana		x		x
		Hemigenia pritzelii	x	x		x
		Lachnostachys verbascifolia				x
Lauraceae		*Cassytha racemosa*	x	x		
		Cassytha sp.		x	x	x
Lentibulariaceae		*Utricularia multifida*		x		
Lindsaeaceae		*Lindsaea linearis*	x	x		x
Loganiaceae		*Logania serpyllifolia*	x	x		
		Logania serpyllifolia subsp. angustifolia		x		
		Orianthera serpyllifolia				x
Loranthaceae		*Nuytsia floribunda*		x		
Malvaceae		*Lasiopetalum floribundum*	x	x	x	x
		Lasiopelatum glabratum	x	x		x
		Thomasia paniculata	x	x	x	x
Myrtaceae		*Astartea scoparia*	x	x	x	x
		Babingtonia camphorosmae	x	x	x	x
		Beaufortia macrostemon		x		
		Calothamnus planifolius		x		

APPENDIX C: VASCULAR PLANT SPECIES NEAR AND WITHIN THE ONEIL SURVEY AREAS, 1998 TO 2024

Note: *Denotes introduced species; P1 and P4 denote Priority Flora Species (DBCA 2401)

Family		Species	1998	2009	2023	2024
Myrtaceae		*Calothamnus planifolius* var. *planifolius*				x
(continued)		*Calothamnus quadrifidus*		x		
		Calytrix ?angulata		x		
		Corymbia calophylla	x	x	x	x
		Darwinia citriodora				x
		Darwinia thymoides				x
		Eucalyptus aspersa		x		x
		Eucalyptus marginata	x	x	x	x
		Eucalyptus megacarpa	x	x	x	x
		Eucalyptus patens	x	x	x	x
		Eucalyptus rudis	x	x		x
		Eucalyptus wandoo				x
		Hypocalymma angustifolium	x	x	x	x
		Hypocalymma cordifolium	x	x	x	x
		Hypocalymma robustum		x		x
		Hypocalymma sp.				x
		Kunzea ericifolia		x		
		Kunzea micrantha		x		
		Kunzea recurva	x	x		x
		Leptospermopsis erubescens		x		x
		Melaleuca incana	x		x	x
		Melaleuca incana subsp. incana	x	x		
		Melaleuca lateritia		x		x
		Melaleuca parviceps		x		x
		Melaleuca pauciflora	x	x	x	x
		Melaleuca preissiana	x	x	x	x
		Melaleuca rhaphiophylla		x		x
		Melaleuca ?subtrigona				x
		Melaleuca trichophylla		x		
		Melaleuca viminea	x	x		x
		Melaleuca viminea subsp. *viminea*		x		
		Melaleuca sp.		x		x
		Pericalymma ellipticum	x	x		x
		Taxandria linearifolia	x	x	x	x
		Verticordia acerosa var. *preissii*				x
		Verticordia densiflora		x		x
		Verticordia densiflora var. *cespitosa*				x
		Verticordia huegelii var. decumbens				x
		Verticordia huegelii var. huegelii		x		
		Verticordia pennigera		x		
		Verticordia plumosa var. plumosa		x		x
		Verticordia serrata var. serrata				x
		Verticordia serrata		x		
		Verticordia sp.				x
		Myrtaceae sp.		x		x
Olacaceae		*Olax benthamiana*	x			x
Orchidaceae		*Caladenia flava*		x		
		Caladenia flava subsp. *flava*		x		
		Caladenia sp.		x	x	
		Cyrtostylis heugelii	x			
		Elythranthera brunonis		x		
		Elythranthera sp.		x		
		Eriochilus dilatatus	x			
		Microtis media	x			

APPENDIX C: VASCULAR PLANT SPECIES NEAR AND WITHIN THE ONEIL SURVEY AREAS, 1998 TO 2024

Note: *Denotes introduced species; P1 and P4 denote Priority Flora Species (DBCA 2401)

Family		Species	1998	2009	2023	2024
Orchidaceae		*Pterostylis vittata*	x			
(continued)		*Pterostylis* sp.		x	x	x
		Pyrorchis nigricans	x			
		Thelymitra crinita	x			
		Thelymitra sp.		x		
		Orchidaceae sp.		x	x	x
Orobanchaceae	*	*Orobanche minor*				x
	*	*Parentucellia latifolia*		x		
Oxalidaceae		*Oxalis* sp.			x	
Phyllanthaceae		*Lysiandra calycina*	x	x	x	x
		Poranthera huegelii		x		
Philydraceae		*Philydrella drummondii*		x		
Pittosporaceae		*Billardiera floribunda*	x	x		
		Billardiera fusiformis		x		x
		Billardiera heterophylla	x			
		Billardiera variifolia	x	x		x
		Billardiera sp.		x		x
		Marianthus bicolor	x			
		Marianthus drummondianus	x	x		x
Plantaginaceae	*	*Plantago lanceolata*	x			
Poaceae	*	*Aira caryophyllea*	x	x		x
	*	*Aira cupaniana*		x		
		Amphipogon amphipogonoides	x	x		x
		Amphipogon laguroides subsp. laguroides		x		
		Amphipogon turbinatus		x		
		Austrostipa campylachne		x		
		Austrostpa elegantissima	x			
		Neurachne alopecuroidea	x	x		x
	*	*Pentaschistis airoides*		x		x
		Rytidosperma acerosum		x		
		Rytidosperma caespitosum	x	x	x	x
		Rytidosperma setacea		x		
		Rytidosperma sp.		x		
		Tetrarrhena laevis	x	x	x	x
		Poaceae sp.		x	x	x
Podocarpaceae		Podocarpus drouynianus				x
Polygalaceae		*Comesperma calymega*	x	x		x
		Comesperma confertum	x			
		Comesperma polygaloides		x		
		Comesperma virgatum	x	x		x
		Comesperma sp.				x
Primulaceae	*	*Lysimachia arvensis*				x
		Samolus junceus				x

APPENDIX C: VASCULAR PLANT SPECIES NEAR AND WITHIN THE ONEIL SURVEY AREAS, 1998 TO 2024

Note: *Denotes introduced species; P1 and P4 denote Priority Flora Species (DBCA 2401)

Family		Species	1998	2009	2023	2024
Proteaceae		*Adenanthos barbiger*		x	x	x
		Adenanthos cygnorum		x		x
		Adenanthos cygnorum subsp. cygnorum		x		
		Adenanthos meisneri				x
		Adenanthos obovatus		x		
		Banksia armata var. *armata*		x		x
		Banksia bipinnatifida subsp. *bipinnatifida*		x		x
		Banksia dallanneyi subsp. *dallanneyi* var. *dallanneyi*	x	x	x	x
		Banksia dallanneyi subsp. *sylvestris*		x		x
		Banksia grandis	x	x	x	x
		Banksia littoralis	x	x	x	x
		Banksia seminuda	x	x	x	
		Banksia sessilis	x	x		x
		Banksia sphaerocarpa var. *sphaerocarpa*		x		x
		Banksia squarrosa		x		x
		Banksia squarrosa subsp. *squarrosa*		x		
		Conospermum amoenum		x		
		Conospermum amoenum subsp. *amoenum*				x
		Conospermum canaliculatum subsp. canaliculatum				x
		Conospermum capitatum	x	x		
		Conospermum capitatum subsp. *capitatum*				x
		Conospermum capitatum subsp. *glabratum*		x		
		Conospermum stoechadis				x
		Grevillea bipinnatifida		x		x
		Grevillea dissectifolia				x
	P3	*Grevillea diversifolia*		x		x
		Grevillea diversifolia subsp. diversifolia		x		
		Grevillea manglesii subsp. manglesii		x		
		Grevillea monticola				x
		Grevillea pulchella		x		x
		Grevillea pulchella subsp. ascendens		x		x
		Grevillea quercifolia	x	x		x
		Grevillea trifida		x		
		Grevillea wilsonii		x		x
		Hakea amplexicaulis	x	x	x	x
		Hakea cyclocarpa				x
		Hakea erinacea		x		x
		Hakea incrassata	x	x		x
		Hakea lissocarpha	x	x	x	x
		Hakea marginata		x		x
		Hakea prostrata	x	x		x
		Hakea ruscifolia	x	x		x
		Hakea trifurcata		x		x
		Hakea undulata		x		x
		Hakea varia	x	x		x
		Hakea sp.		x		x
		Isopogon crithmifolius		x		
		Isopogon dubius		x	x	x
		Isopogon pallidus				x
		Isopogon sphaerocephalus		x		x
		Persoonia angustiflora	x	x		x
		Persoonia elliptica	x	x		x
		Persoonia longifolia	x	x	x	x
		Petrophile heterophylla		x		
		Petrophile seminuda				x
		Petrophile serruriae		x		x

APPENDIX C: VASCULAR PLANT SPECIES NEAR AND WITHIN THE ONEIL SURVEY AREAS, 1998 TO 2024

Note: *Denotes introduced species; P1 and P4 denote Priority Flora Species (DBCA 2401)

Family		Species	1998	2009	2023	2024
Proteaceae		*Petrophile striata*	x	x		x
(continued)		*Petrophile* sp.				x
		Stirlingia latifolia		x		x
		Stirlingia simplex		x		
		Synaphea cuneata				x
		Synaphea damopsis	x	x		
		Synaphea gracillima	x	x		
		Synaphea petiolaris	x	x		x
		Synaphea sp.				x
		Xylomelum occidentale	x	x		
Pteridaceae		*Cheilanthes sieberi*				x
Ranunculaceae		*Clematis pubescens*	x	x	x	x
		Ranunculus colonorum	x	x		
		Ranunculus sp.			x	
		Ranunculaceae sp.			x	
Restionaceae		*Alexgeorgea nitens*		x		x
		Desmocladus fasciculatus	x	x	x	x
		Desmocladus flexuosus		x	x	x
		Desmocladus sp.				x
		Hypolaena exsulca	x	x		x
		Lepidobolus chaetocephalus		x		
		Lepidobolus preissianus		x		x
		Lepidobolus preissianus subsp. *preissianus*		x		
		Leptocarpus canus	x	x		
		Leptocarpus coangustatus		x		
		Leptocarpus scariosus	x	x		
		Leptocarpus tenax		x		
		Leptocarpus sp.				x
		Lepyrodia glauca				x
		Lepyrodia riparia		x		
		Loxocarya cinerea	x	x		x
		Restionaceae sp.				x
Rhamnaceae		*Cryptandra arbutiflora*	x	x		x
		Trymalium ledifolium	x	x	x	x
		Trymalium odoratissimum	x	x	x	x
		Trymalium odoratissimum subsp. odoratissimum		x		
Rubiaceae		*Opercularia apiciflora*	x	x		x
		Opercularia echinocephala	x	x	x	x
		Opercularia hispidula	x	x		
Rutaceae		*Asterolasia pallida s*ubsp. *pallida*		x		
		Boronia crenulata	x	x		x
		Boronia crenulata var. *crenulata*				x
		Boronia crenulata subsp*. viminea*		x		
		Boronia fastigiata	x	x	x	x
		Boronia molloyae		x		
		Boronia sp.				x
		Philotheca spicata	x	x	x	x
Santalaceae		*Exocarpos sparteus*		x		
		Leptomeria cunninghamii	x	x	x	x

APPENDIX C: VASCULAR PLANT SPECIES NEAR AND WITHIN THE ONEIL SURVEY AREAS, 1998 TO 2024

Note: *Denotes introduced species; P1 and P4 denote Priority Flora Species (DBCA 2401)

Family		Species	1998	2009	2023	2024
Sapindaceae		*Dodonaea ceratocarpa*		x		x
Stackhousiaceae		*Stackhousia monogyna*	x	x		x
		Tripterococcus brunonis	x	x		x
Stylidiaceae		*Levenhookia pusilla*		x		x
		Levenhookia stipitata				x
		Levenhookia sp.		x		x
		Stylidium affine				x
		Stylidium amoenum	x	x	x	x
		Stylidium bulbiferum				x
		Stylidium brunonianum		x		
		Stylidium calcaratum		x		
		Stylidium canaliculatum	x			
		Stylidium ciliatum				x
		Stylidium dichotomum		x		x
		Stylidium diuroides subsp. diuroides		x		
		Stylidium hispidum				x
		Stylidium junceum	x	x		
		Stylidium piliferum	x	x	x	x
		Stylidium pulchellum		x		
		Stylidium recurvum				x
		Stylidium repens		x		
		Stylidium scariosum				x
		Stylidium schoenoides		x		
		Stylidium thesioides		x		
		Stylidium sp.				x
Thymelaeceae		*Pimelea ciliata*	x	x		x
		Pimelea ciliata subsp. ciliata		x		
		Pimelea lehmanniana	x	x		
		Pimelea spectabilis		x		
		Pimelea suaveolens	x	x	x	x
		Pimelea sp.			x	x
Tremandraceae		*Tetratheca hirsuta*	x	x	x	x
		*Tetratheca hirsuta s*ubsp. v*iminea*				x
Violaceae		*Hybanthus floribundus*	x			x
Xanthorrhoeaceae		*Xanthorrhoea gracilis*	x	x	x	x
		Xanthorrhoea preissii	x	x	x	x
Zamiaceae		*Macrozamia riedlei*	x	x	x	x

APPENDIX D: LOCATION OF PRIORITY SPECIES RECORDED ON ONEIL SURVEY AREAS IN 2024

Note P1 - P4 Prioirty species defined in DBCA 2024a; SCC - State Conservation Code

EASTING	NORTHING	DATUM	GRID REF	SCC	Species	RANK
431660	6405866	GDA94	L4224 3228	P1	Hibbertia ?ambita	2
432618	6404069	GDA94	M4305 3232	P1	Hibbertia horitorum	2
432620	6404311	GDA94	M4305 1632	P1	Hibbertia horitorum	3
431555	6403833	GDA94	L4312 0820	P1	Hibbertia horitorum	1
431551	6403948	GDA94	L4308 4020	P1	Hibbertia horitorum	4
431291	6404314	GDA94	L4308 1604	P1	Hibbertia horitorum	1
436449	6396998	GDA94	N4425 2448	P1	Hibbertia horitorum	3
433940	6395674	GDA94	M4506 3260	P1	Hibbertia horitorum	2
436216	6397595	GDA94	N4421 2432	P1	Hibbertia horitorum	2
436353	6397343	GDA94	N4421 4040	P1	Hibbertia horitorum	2
436349	6397465	GDA94	N4421 3240	P1	Hibbertia horitorum	2
434540	6397949	GDA94	M4419 4040	P1	Hibbertia horitorum	1
437424	6399863	GDA94	N4406 3252	P1	Hibbertia horitorum	1
437301	6399151	GDA94	N4410 4044	P1	Hibbertia horitorum	1
437300	6399265	GDA94	N4410 3244	P1	Hibbertia horitorum	4
437416	6399269	GDA94	N4410 3252	P1	Hibbertia horitorum	3
436704	6399746	GDA94	N4406 4004	P1	Hibbertia horitorum	2
436694	6399864	GDA94	N4406 3204	P1	Hibbertia horitorum	2
436817	6399988	GDA94	N4406 2412	P1	Hibbertia horitorum	2
435372	6399522	GDA94	M4412 1636	P1	Hibbertia horitorum	1
435614	6399032	GDA94	M4416 0852	P1	Hibbertia horitorum	1
436093	6399746	GDA94	N4405 4024	P1	Hibbertia horitorum	1
432247	6403716	GDA94	M4309 1608	P1	Hibbertia horitorum	2
432262	6403596	GDA94	M4309 2408	P1	Hibbertia horitorum	2
432264	6403460	GDA94	M4309 3208	P1	Hibbertia horitorum	2
432382	6403833	GDA94	M4309 0816	P1	Hibbertia horitorum	2
432870	6404070	GDA94	M4305 3248	P1	Hibbertia horitorum	2
432734	6404200	GDA94	M4305 2440	P1	Hibbertia horitorum	2
431906	6403833	GDA94	L4312 0844	P1	Hibbertia horitorum	2
431901	6403707	GDA94	L4312 1644	P1	Hibbertia horitorum	2
431781	6403827	GDA94	L4312 0836	P1	Hibbertia horitorum	2
431651	6403830	GDA94	L4312 0828	P1	Hibbertia horitorum	2
431311	6404430	GDA94	L4308 0804	P1	Hibbertia horitorum	2
436347	6395448	GDA94	N4509 0840	P1	Hibbertia horitorum	2
436826	6396872	GDA94	N4426 3212	P1	Hibbertia horitorum	1
433820	6395800	GDA94	M4506 2452	P1	Hibbertia horitorum	2
433924	6395788	GDA94	M4506 2460	P1	Hibbertia horitorum	2
433811	6396027	GDA94	M4506 0852	P1	Hibbertia horitorum	2
433837	6395918	GDA94	M4506 1652	P1	Hibbertia horitorum	2
433472	6396035	GDA94	M4506 0828	P1	Hibbertia horitorum	2
433467	6395910	GDA94	M4506 1628	P1	Hibbertia horitorum	2
433467	6396144	GDA94	M4502 4028	P1	Hibbertia horitorum	1
433824	6395556	GDA94	M4506 4052	P1	Hibbertia horitorum	1
433704	6396160	GDA94	M4502 4044	P1	Hibbertia horitorum	1
432632	6396506	GDA94	M4501 1632	P1	Hibbertia horitorum	2

APPENDIX D: LOCATION OF PRIORITY SPECIES RECORDED ON ONEIL SURVEY AREAS IN 2024

Note P1 - P4 Prioirty species defined in DBCA 2024a; SCC - State Conservation Code

EASTING	NORTHING	DATUM	GRID REF	SCC	Species	RANK
433456	6396267	GDA94	M4502 3228	P1	Hibbertia horitorum	3
433447	6396399	GDA94	M4502 2428	P1	Hibbertia horitorum	2
433461	6396651	GDA94	M4502 0828	P1	Hibbertia horitorum	2
433576	6396635	GDA94	M4504 0836	P1	Hibbertia horitorum	1
433580	6396766	GDA94	M4426 4036	P1	Hibbertia horitorum	2
433473	6396747	GDA94	M4426 4028	P1	Hibbertia horitorum	1
433348	6396746	GDA94	M4426 4020	P1	Hibbertia horitorum	2
433344	6396877	GDA94	M4426 3220	P1	Hibbertia horitorum	3
435852	6398542	GDA94	N4413 4008	P1	Hibbertia horitorum	4
435860	6398786	GDA94	N4413 2408	P1	Hibbertia horitorum	3
435845	6399022	GDA94	N4413 0808	P1	Hibbertia horitorum	1
436001	6398693	GDA94	N4413 3216	P1	Hibbertia horitorum	3
436099	6398673	GDA94	N4413 3224	P1	Hibbertia horitorum	2
436093	6398550	GDA94	N4413 4024	P1	Hibbertia horitorum	3
434479	6398424	GDA94	M4419 0856	P1	Hibbertia horitorum	1
435712	6398544	GDA94	M4416 4060	P1	Hibbertia horitorum	1
433235	6403714	GDA94	M4310 1612	P3	Grevillea dissectifolia	2
432869	6404170	GDA94	M4305 2448	P3	Grevillea dissectifolia	2
431788	6404307	GDA94	L4308 1636	P3	Grevillea dissectifolia	1
436589	6396638	GDA94	N4501 0856	P3	Grevillea dissectifolia	4
436692	6396504	GDA94	N4502 1604	P3	Grevillea dissectifolia	3
436542	6396872	GDA94	N4425 3256	P3	Grevillea dissectifolia	5
436584	6396754	GDA94	N4425 4056	P3	Grevillea dissectifolia	4
437042	6395660	GDA94	N4506 3228	P3	Grevillea dissectifolia	2
436923	6395673	GDA94	N4506 3220	P3	Grevillea dissectifolia	4
436957	6395787	GDA94	N4506 2420	P3	Grevillea dissectifolia	5
436937	6395906	GDA94	N4506 1620	P3	Grevillea dissectifolia	4
436449	6396998	GDA94	N4425 2448	P3	Grevillea dissectifolia	3
436576	6396978	GDA94	N4425 2456	P3	Grevillea dissectifolia	4
436700	6396821	GDA94	N4426 3204	P3	Grevillea dissectifolia	2
436826	6396872	GDA94	N4426 3212	P3	Grevillea dissectifolia	4
436475	6397101	GDA94	M4425 1648	P3	Grevillea dissectifolia	4
433946	6395920	GDA94	M4506 1660	P3	Grevillea dissectifolia	1
433461	6396651	GDA94	M4502 0828	P3	Grevillea dissectifolia	1
433473	6396747	GDA94	M4426 4028	P3	Grevillea dissectifolia	1
433344	6396877	GDA94	M4426 3220	P3	Grevillea dissectifolia	2
435738	6396873	GDA94	M4428 3260	P3	Grevillea dissectifolia	2
435739	6396748	GDA94	M4428 4060	P3	Grevillea dissectifolia	3
436216	6397595	GDA94	N4421 2432	P3	Grevillea dissectifolia	3
436353	6397343	GDA94	N4421 4040	P3	Grevillea dissectifolia	3
436349	6397465	GDA94	N4421 3240	P3	Grevillea dissectifolia	3
435852	6398542	GDA94	N4413 4008	P3	Grevillea dissectifolia	3
435845	6399022	GDA94	N4413 0808	P3	Grevillea dissectifolia	2
436001	6398693	GDA94	N4413 3216	P3	Grevillea dissectifolia	2
435983	6398556	GDA94	N4413 4016	P3	Grevillea dissectifolia	1

APPENDIX D: LOCATION OF PRIORITY SPECIES RECORDED ON ONEIL SURVEY AREAS IN 2024

Note P1 - P4 Prioirty species defined in DBCA 2024a; SCC - State Conservation Code

EASTING	NORTHING	DATUM	GRID REF	SCC	Species	RANK
433804	6398677	GDA94	M4414 3252	P3	Grevillea dissectifolia	2
435711	6398432	GDA94	M4420 0860	P3	Grevillea dissectifolia	3
435500	6398556	GDA94	M4416 4044	P3	Grevillea dissectifolia	3
435719	6398320	GDA94	M4420 1660	P3	Grevillea dissectifolia	2
435372	6399621	GDA94	M4412 0836	P3	Grevillea dissectifolia	2
434535	6399506	GDA94	M4411 1640	P3	Grevillea dissectifolia	1
434299	6398198	GDA94	M4419 2424	P4	Senecio leucoglossus	1
434422	6397944	GDA94	M4419 4032	P4	Senecio leucoglossus	2
434765	6398179	GDA94	M4419 2456	P4	Senecio leucoglossus	2
434781	6398304	GDA94	M4419 1656	P4	Senecio leucoglossus	2
434646	6398196	GDA94	M4419 2448	P4	Senecio leucoglossus	2
434542	6398184	GDA94	M4419 2440	P4	Senecio leucoglossus	4
434898	6398071	GDA94	M4420 3204	P4	Senecio leucoglossus	2
434548	6398304	GDA94	M4419 1640	P4	Senecio leucoglossus	2
434658	6398309	GDA94	M4419 1648	P4	Senecio leucoglossus	2
434416	6398195	GDA94	M4419 2432	P4	Senecio leucoglossus	2
434781	6398066	GDA94	M4419 3256	P4	Senecio leucoglossus	1
434307	6398066	GDA94	M4419 3224	P4	Senecio leucoglossus	3
434658	6397947	GDA94	M4419 4048	P4	Senecio leucoglossus	1
434774	6397950	GDA94	M4419 4056	P4	Senecio leucoglossus	1
435019	6398184	GDA94	M4420 2412	P4	Senecio leucoglossus	2
435022	6397943	GDA94	M4420 4012	P4	Senecio leucoglossus	2