FLORA AND VEGETATION VALUES

ALCOA OF AUSTRALIA

HOLYOAKE EAST

HUNTLY MINE, WA

Prepared By

Mattiske Consulting Pty Ltd

Prepared For

Alcoa of Australia Limited

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LIST OF ABBREVIATIONS

BAM Act:	*Biosecurity and Agriculture Management Act 2007* (WA)
BC Act:	*Biodiversity Conservation Act 2016* (WA)
BOM:	Bureau of Meteorology
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)
MCPL:	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 January 2022 by GHD on behalf of Alcoa of Australia Ltd to conduct a desktop assessment to evaluate the potential flora and vegetation values within the Holyoake East areas, approximately 80 km south east of Perth, WA. Alcoa wishes to expand their mining operations into the Holyoake East region. This was then followed by detailed field studies over the period from December 2022 to September 2023 for detailed flora and vegetation studies. The Holyoake East survey area is located in tenement ML 1SA and consists of three priority areas within the Cameron, Kennedy East and Pindalup North blocks.

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 Holyoake East 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 2023 in line with some changes in nomenclature from 2022 to 2023.

The Holyoake East 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

A total of 860 vascular plant taxa, representative of 267 genera and 85 families (Appendix B), have the potential to occur within the Holyoake East survey area (Mattiske Consulting 2022). The most commonly represented families were Fabaceae (110 taxa), Orchidaceae (66 taxa), Myrtaceae (68 taxa) and Proteaceae (63 taxa). The most commonly represented genera were *Acacia* (40 taxa), *Stylidium* (29 taxa), *Hibbertia* (22 taxa) and *Drosera* (20 taxa).

A total of seven threatened flora species and 25 priority flora species have the potential to occur in the Holyoake East survey area. Of the threatened flora species, *Anthocercis gracilis* (T) is the only potential species and this species occurs on granite outcrops.

In 2022 and 2023, the data indicated that of the Priority flora species, four priority flora species have a high potential to be in the survey area and eleven priority flora species have a moderate potential to be in the survey area.

A total of 80 introduced taxa have the potential to occur in the Holyoake East survey area (Appendices B and D). Six of the introduced species are declared pest organisms pursuant to section 22 of the BAM Act (DPIRD 2023). Four of the introduced taxa are listed Weeds of National Significance (DCCEEW 2023d). Some of these species may not occur in the less disturbed forest areas and as such reflect the wide radial approach to database searches.

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 Holyoake East survey area. Although there are communities associated with granite outcrop areas that have been listed as PEC's at the State level to the north and east, on the basis of the database searches and previous observations, the occurrence of granite outcrops in the Holyoake East survey area is likely to be much lower and if present more localised in extent.
The Holyoake East survey area occurs within the Regional Forest Agreement (RFA) area of the southwest forests DCCEEW (2023b) 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 Holyoake East survey area. In view of the proximity of the Dwellingup as a forestry township it is unlikely that there will be additional old growth forests in the survey area. The Holyoake East has areas of dieback in some of the valley systems. The results for the dieback occurrence in these survey areas may also reflect the degree of sampling which is less intensive than in the western areas of the northern Jarrah forest.

Survey Effort

The survey effort in the Holyoake East survey areas includes data from the earlier transect studies within the northern valley systems to the more recent plots established on a range of the site-vegetation types within the survey area and the extensive recording on a grid pattern and targeted searches across the survey area. The other aspect of the survey efforts relates to the coverage over a range of seasons in 2022 and 2023.

These studies have been supplemented by extensive detailed plot and transect studies in the Northern Jarrah Forest over 40 years. 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 Holyoake East 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

A total of 474 vascular plant taxa, representative of 192 genera and 66 families (Appendix B), have been recorded in the Holyoake East survey area. The most commonly represented families were Fabaceae (65 taxa), Proteaceae (38 taxa), Asteraceae (39 taxa) and Myrtaceae (30 taxa). The most commonly represented genera were *Lomandra* (19 taxa), *Acacia* (18 taxa) and *Hibbertia* (15 taxa).

A total of 2 priority flora species (*Lasiopetalum cardiophyllum* P4 and *Senecio leucoglossus* P4) were recorded either within or near the Holyoake East survey area and a range extension of *Leucopogon darlingensis* subsp. *darlingensis* was recorded in the Holyoake East survey area.

A total of 28 introduced taxa were recorded in the Holyoake East survey area. None of the introduced species are declared pest organisms pursuant to section 22 of the BAM Act (DPIRD 2023). None of the introduced taxa are listed Weeds of National Significance (DCCEEW 2023d). The majority of the introduced species are relatively short lived annuals.

Recorded Vegetation

A total of 19 site-vegetation types were defined and mapped in the Holyoake East survey area and an addition two mapping units (CL cleared land and PL – plantations). The site-vegetation types were defined on the basis of key species and site parameters as defined in Habel (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 Holyoake East survey area (namely PS, S, TS and T which together cover 68.65% of the survey area)**.**

None of these site-vegetation types are restricted to the Holyoake East 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 (2023e) or at State level pursuant to Part 2 of the *BC Act* and as listed by DBCA (2023b) within the Holyoake East survey area.

There are no priority ecological communities (PECs), as listed at State level by DBCA (2023a) within the Holyoake East survey area. At a State or National level none of the site-vegetation types have been listed as Threatened or Priority Ecological Communities.

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 Holyoake East areas, approximately 80 km south east of Perth, WA. Alcoa wishes to expand their mining operations into the Holyoake East region. The desktop completed in 2022 was followed by detailed field studies over the period from December 2022 to September 2023. The Holyoake East survey area is located in tenement ML 1SA and consists of three priority areas as defined by Alcoa of Australia Ltd. These studies incorporated previous data from transects in the northern section undertaken by Mattiske for Alcoa over a series of monitoring times from 1994 to 2015 in the Cameron block and from recent permanent plots established in 2022 within the Holyoake East areas.

1.1. Location and Scope of Project

The Holyoake East 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 Holyoake East 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 Holyoake East 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).

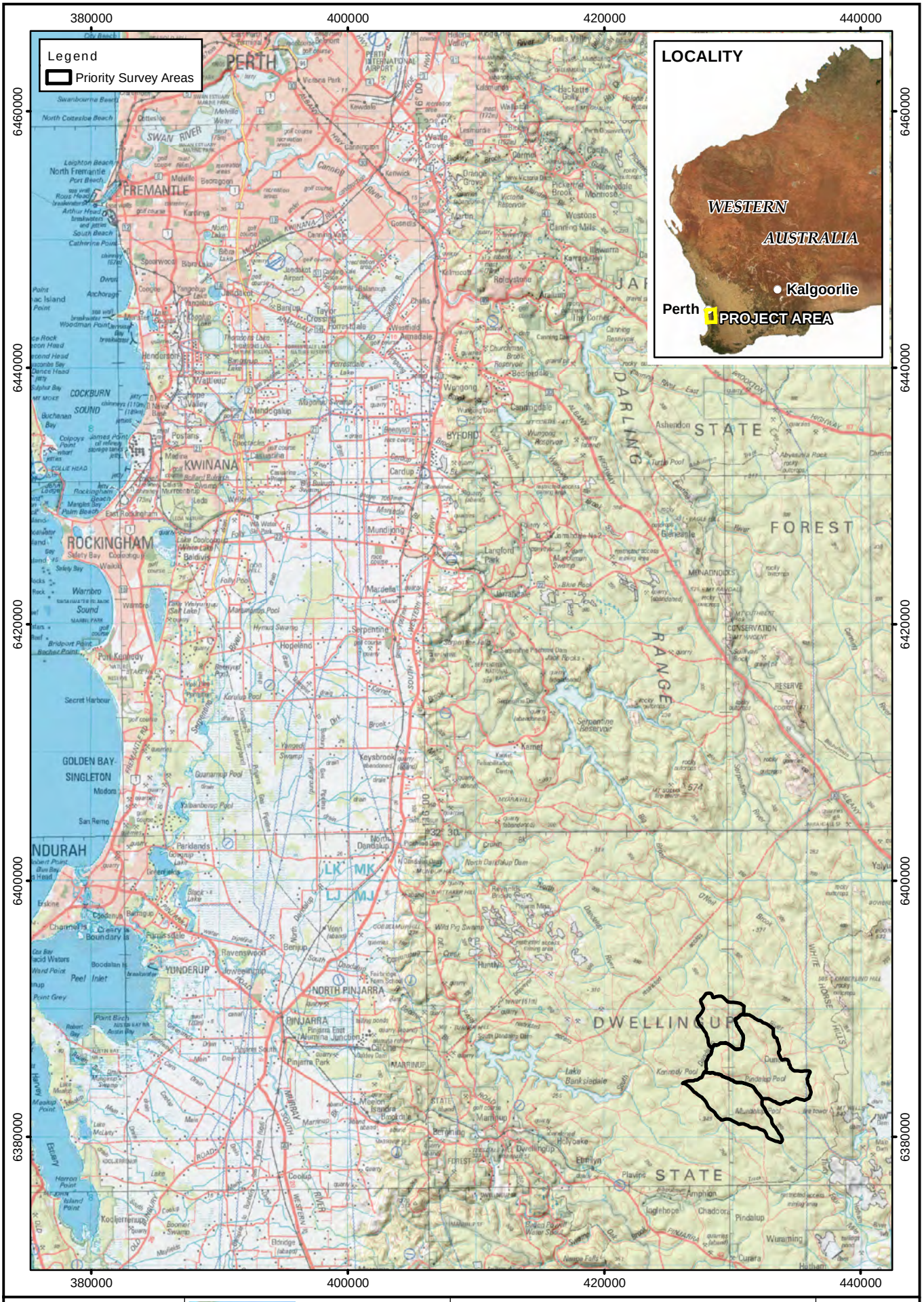
The following key Western Australian (state) legislation relevant to this survey includes the:

- *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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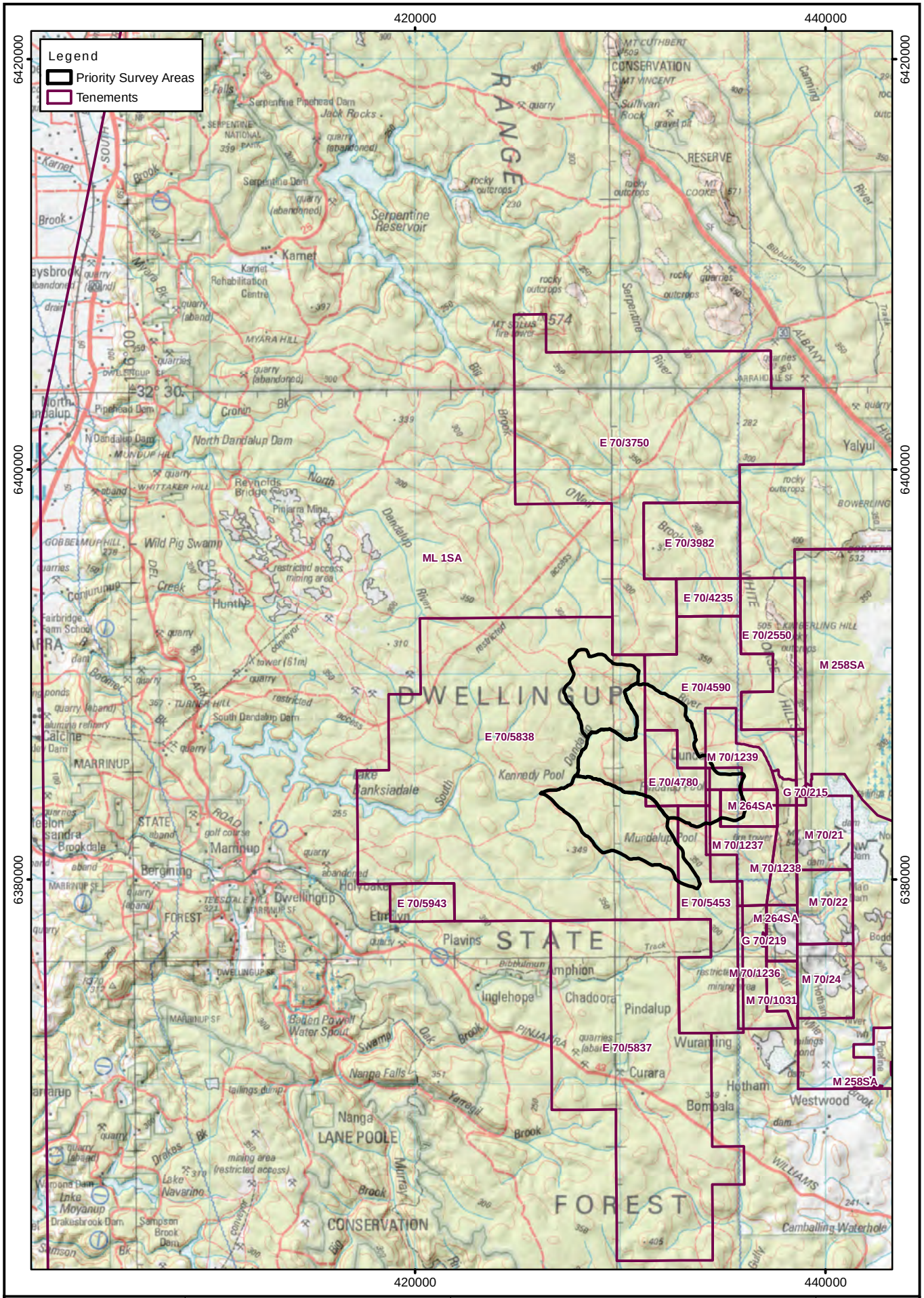
Holyoake East - Priority Areas
Locality

Figure: 1



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Holyoake - Priority Areas
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 Holyoake East survey area, including:

- A desktop assessment of the flora and vegetation of the Holyoake East 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 Holyoake East survey area;
- A summary of key findings from the detailed studies (plots, recording sites, transects and targeted surveys) the Holyoake East area in the period from 2022 to 2023;
- 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] (2023a) 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 Holyoake East 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 Holyoake East survey area was reviewed, including Mattiske Consulting Pty Ltd (1994-2022) reports on their flora and vegetation surveys in the Holyoake East 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. 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 Holyoake East 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)	**Not a constraint:** The survey areas will be 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. Additional targeted work for the flora will be undertaken on specific key areas (granites, creek-lines).
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	**Not a constraint:** The EPA (2016a) recommends that flora and vegetation surveys in the South – West Botanical Province be conducted in Spring (September-November). As the seasons change the sampling over the 12-month period (2022 to 2023) when combined with 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:** Some areas had been recently burnt and hence it was necessary to extrapolate from nearby mapping. Generally, many species take 2 to 3 years to recover after burns in the northern Jarrah forest. **P**revious 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. FINDINGS FROM DESKTOP STUDIES

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

4.1. Climate

The survey area lies at the southern end of the Northern Jarrah Forest subregion. Beard (1990) described the climate of this area as being warm Mediterranean, with rainfall of 600 – 1200 mm per annum and 5 - 6 dry months per year. The closest weather station is the Dwellingup weather station. Annual average rainfall at Dwellingup is 1218.5 mm (Bureau of Meteorology [BOM] 2023). Rainfall in 2021 (1335.4mm) was higher than the long term (LT) of 1221.8mm, see Figure 3. The rainfall decreased in 2022 to 1009.2mm for the year and for the 11 months (January to November in 2023) to 951.6mm, Figure 3. The trend of lowering rainfall is not replicated in similar changes to the temperature.

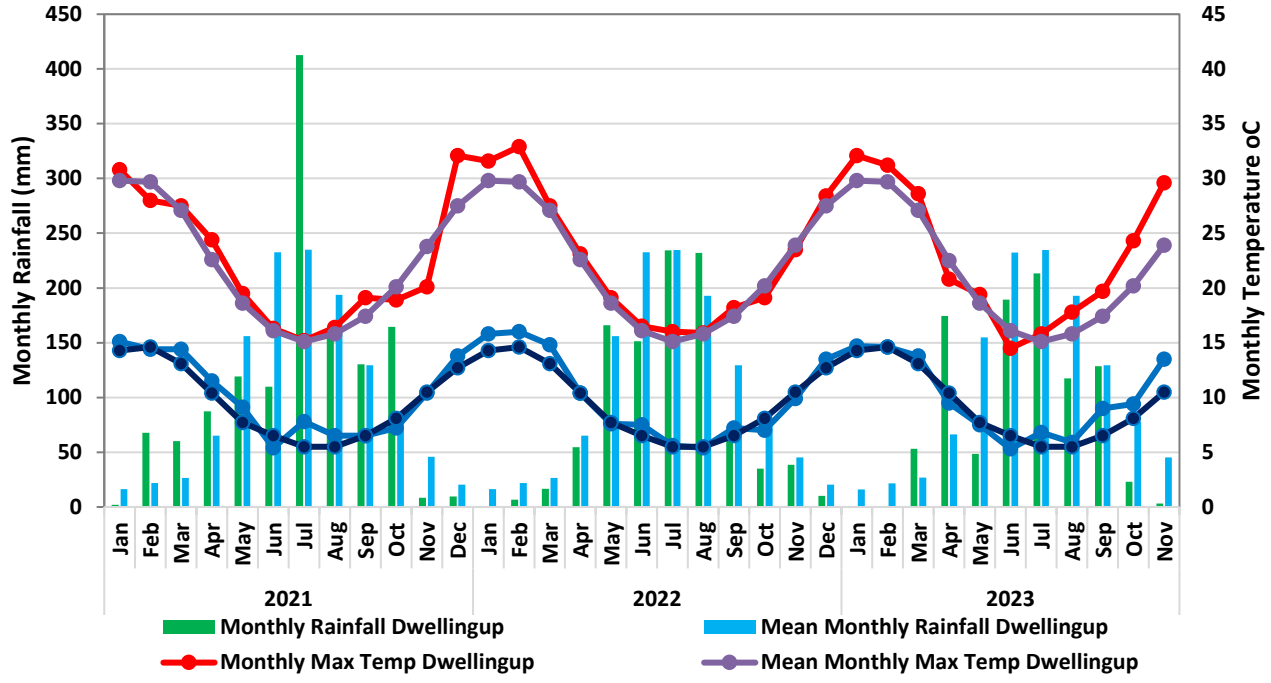
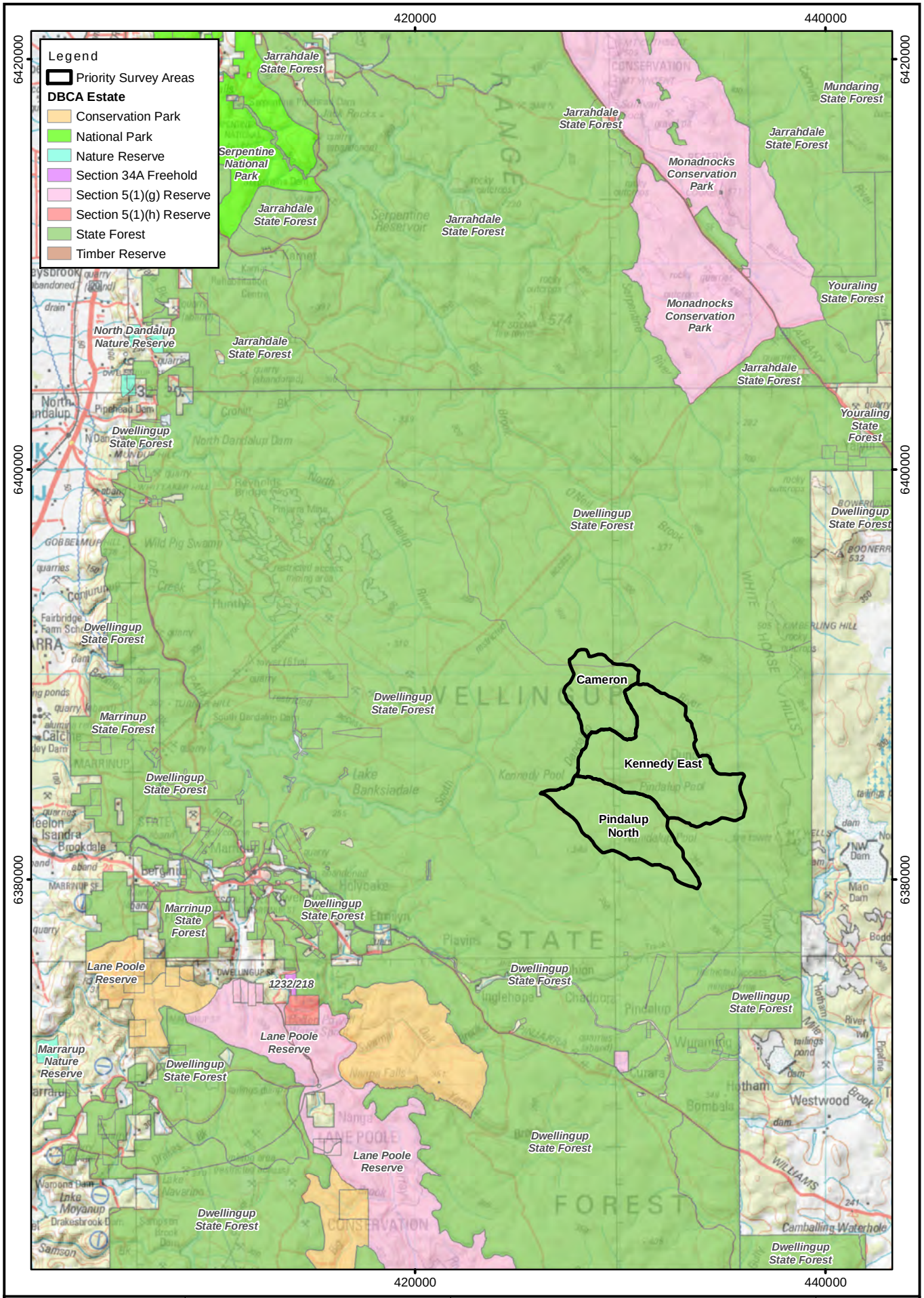


Figure 3: Climatic data for Holyoake East survey area (BOM 2023)
Long term average rainfall and temperature from the Dwellingup weather station

4.2. DBCA Estates

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



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Holyoake East - Priority Areas
DBCA Estates

Figure: **4**

4.3. Geology, Soils and Topography

The Holyoake East 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. These overlay mottled yellow-brown clay subsoils and hard setting loamy soils, which become evident in the east (Beard 1990).

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

The underlying geological units of The Darling Plateau province have been defined by Churchward and McArthur (1980), with 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.

Pindalup: Valleys pf the central part of the plateau, gravelly duplex soils on slopes, some rock outcrop, grey sands, duplex yellow soils and orange earths in broad floors.

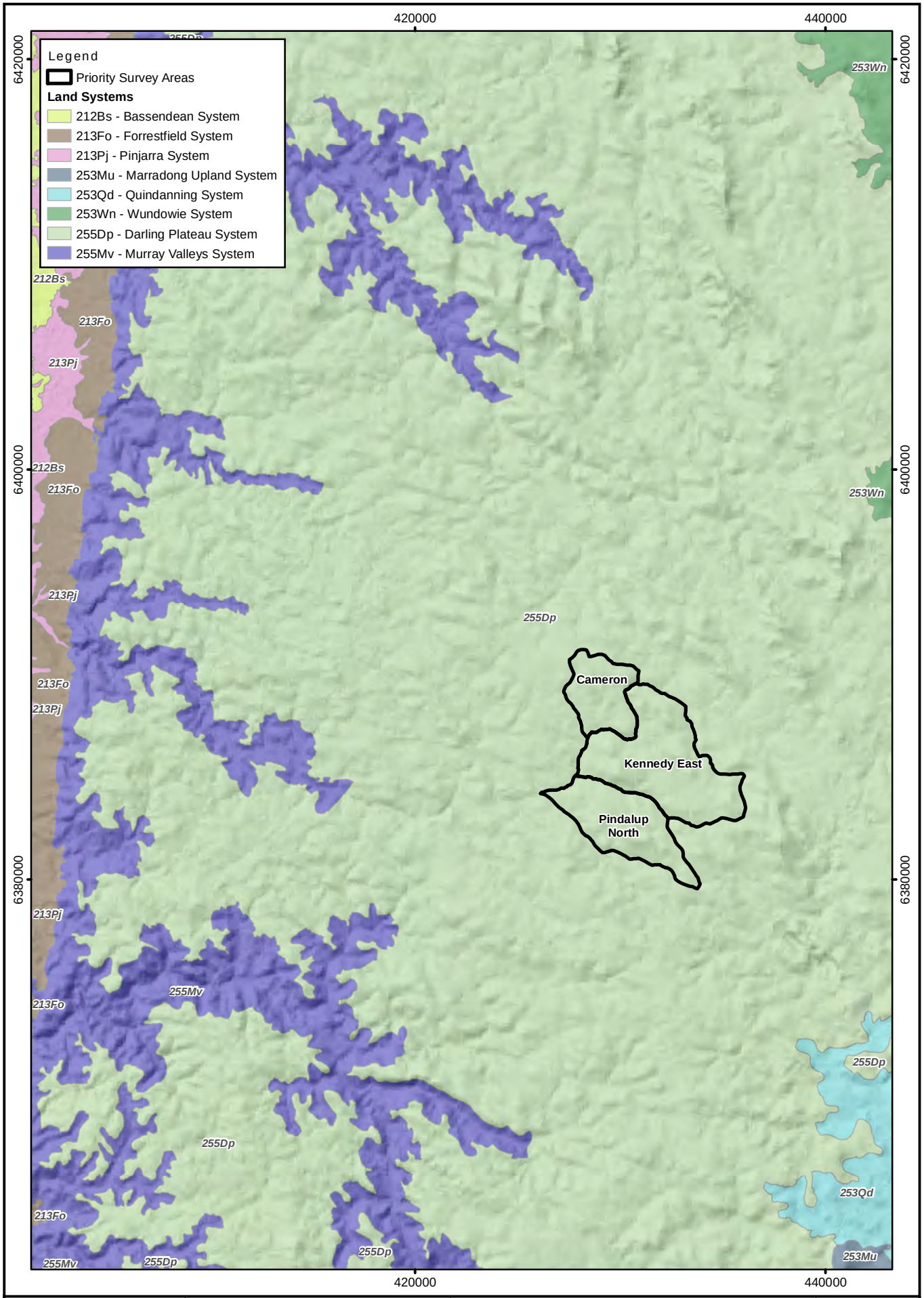
Cook: Hills rising above general plateau level ; mainly laterite but with some rock outcrop.

The Department of Primary Industries and Regional Development's (DPIRD) Land Systems present within the Holyoake East 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.

Table 2: Extent of Land Systems intersecting the Holyoake East survey area

Land System	Mapping Unit	Total Extent (ha)	Area of Intersection with the Holyoake East survey area	Proportion of Current Extent (%)
Darling Plateau System	255Dp	820265.77	5731.14	0.699



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Holyoake East - Priority Areas
Land Systems

Figure: **5**

4.4. Regional Vegetation

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

The Pre-European vegetation system present within the Holyoake East survey area (Figure 6, Table 3) include:

1. **West Darling System**

   Vegetation Association 3.3: Mainly jarrah and marri Eucalyptus marginata, Corymbia calophylla.

2. **East Darling System**

   Vegetation Association 3.3: Mainly jarrah and marri Eucalyptus marginata, Corymbia calophylla

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

System	Vegetation Association	State-wide Pre-European Extent (ha)	Area of Intersection with the Holyoake East survey area (ha)	Proportion of Current Extent (%)
West Darling	3.3	686824.44	5728.91	0.834
East Darling	3.3	303349.65	2.23	0.0007

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. Seven broad vegetation complexes occur in the Holyoake East 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 4 (D4): Open forest to woodland 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).

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.

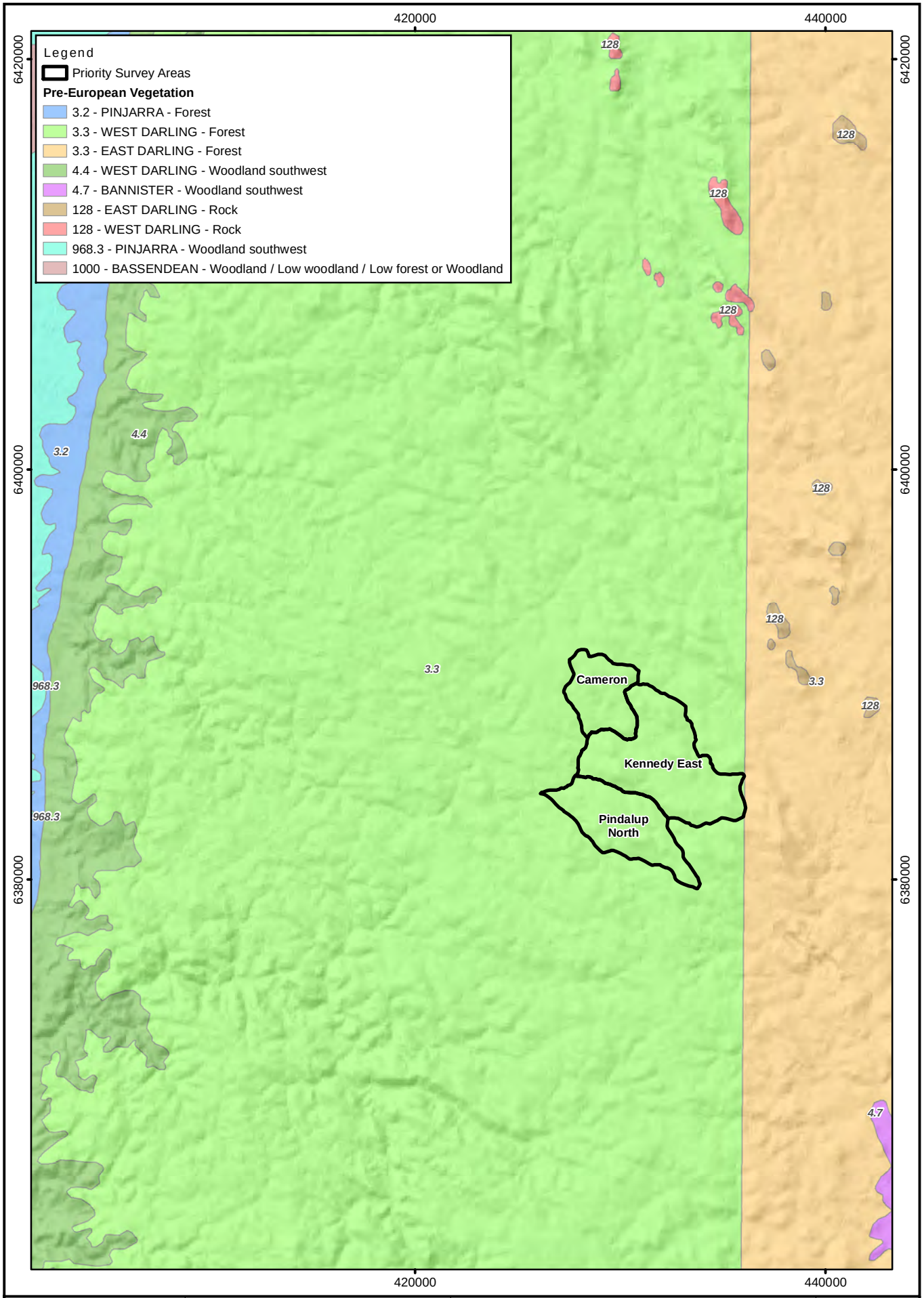
Pindalup (Pn): Open forest of *Eucalyptus marginata* subsp. *thalassica* - *Corymbia calophylla* on slopes and open woodland of *Eucalyptus wandoo with some Eucalyptus patens* on the lower slopes in semiarid and arid zones.

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 2023c). 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 Holyoake East survey area

Area (Blocks)	Vegetation Complex	Vegetation Class	Total Extent (ha)	Area of Intersection with the Holyoake East survey area (ha)	Proportion of Current Extent (%)
Cameron	Dwellingup 1	D1	181038.81	688.305	0.38
	Yarragil 2	Yg2	46475.31	285.847	0.62
	Pindalup	Pn	128358.24	59.100	0.05
	Swamp	S	40612.97	63.038	0.16
Kennedy East	Dwellingup 1	D1	181038.81	1287.175	0.71
	Dwellingup 4	D4	115661.52	111.049	0.10
	Cooke	Ce	30304.20	78.241	0.26
	Yarragil 2	Yg2	46475.31	810.052	1.74
	Pindalup	Pn	128358.24	315.783	0.25
	Swamp	S	40612.97	303.691	0.75
Pindalup North	Dwellingup 1	D1	181038.81	1027.240	0.57
	Cooke	Ce	30304.20	53.358	0.18
	Yarragil 1	Yg1	64927.06	169.512	0.26
	Yarragil 2	Yg2	46475.31	446.483	0.96
	Pindalup	Pn	128358.24	9.147	0.01
	Swamp	S	40612.97	23.125	0.06



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Scale: 1:250,000
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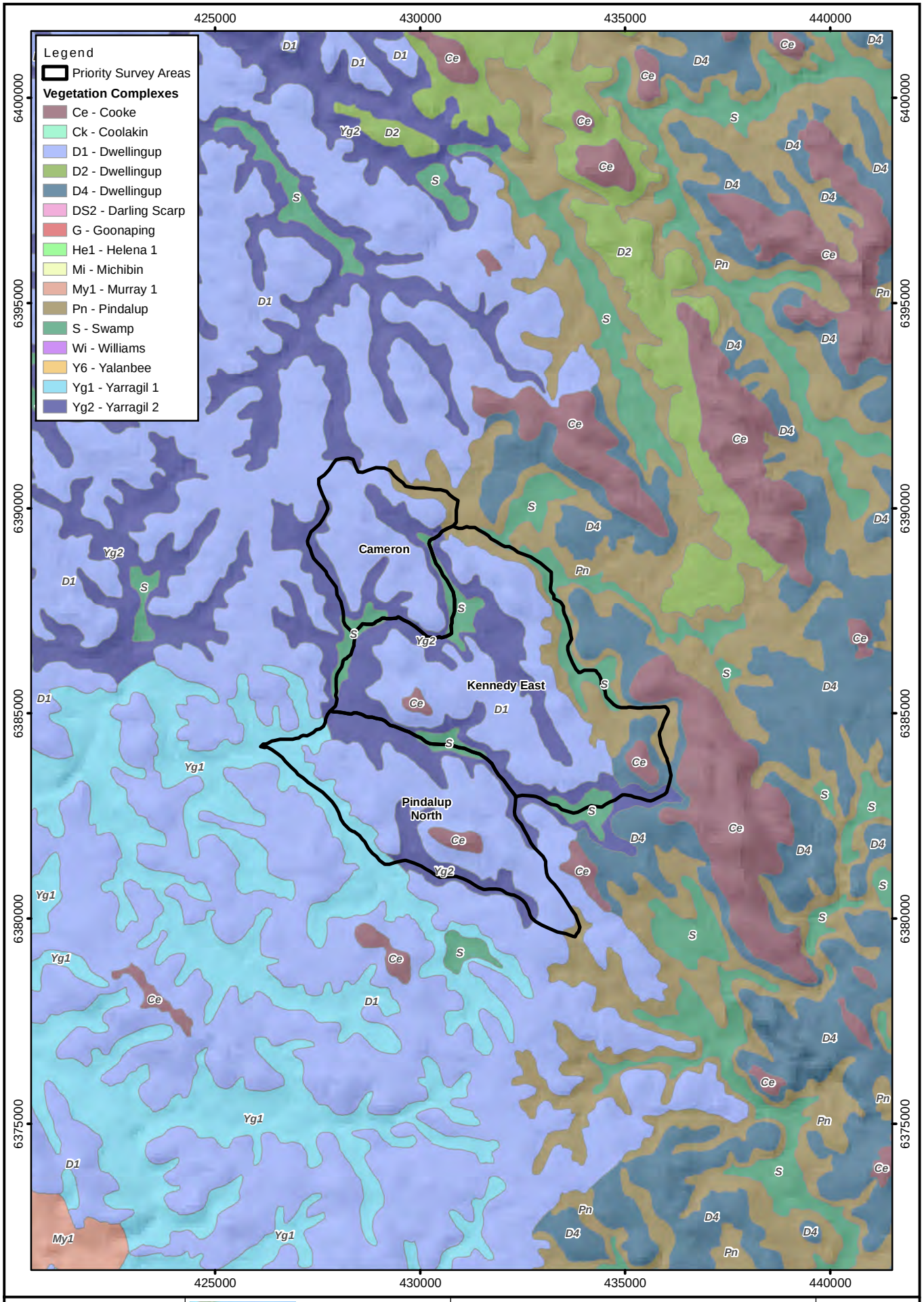
Holyoake East - Priority Areas
Pre-European Vegetation

Figure: **6**



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Holyoake East - Priority Areas
Vegetation Complexes

Figure: **7**

4.5. Potential Flora

A total of 860 vascular plant taxa, representative of 267 genera and 85 families (Appendix B), have the potential to occur within the Holyoake East survey area (Mattiske Consulting 2022). The most commonly represented families were Fabaceae (110 taxa), Orchidaceae (66 taxa), Myrtaceae (68 taxa) and Proteaceae (63 taxa). The most commonly represented genera were *Acacia* (40 taxa), *Stylidium* (29 taxa), *Hibbertia* (22 taxa) and *Drosera* (20 taxa).

4.5.1. Potential Threatened and Priority Flora

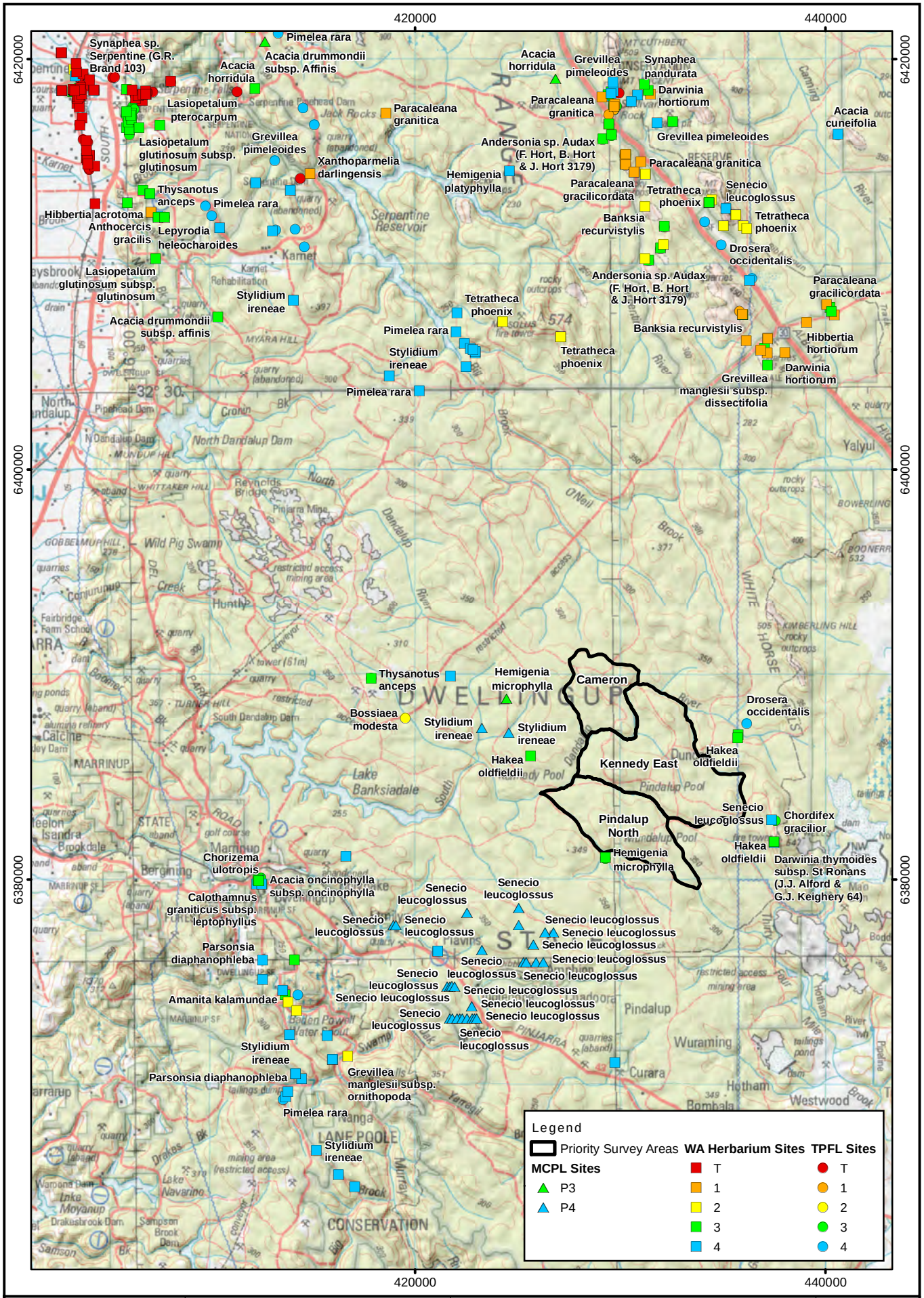
A total of seven threatened flora species and 25 priority flora species have the potential to occur in the Holyoake East survey area (Appendix C, Table 5, Figure 8). Of the threatened flora species, *Anthocercis gracilis* (T) is the only potential species that may occur on granite outcrops. In 2022 and 2023, the data indicated that of the Priority flora species, four priority flora species have a high potential to be in the survey area and eleven priority flora species have a moderate potential to be in the survey area.

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 C, along with their State and Federal Conservation Codes (see Appendix A for definitions), a description and an assessment of the likelihood of their occurrence in the Holyoake East survey area.

Based on this assessment, one threatened flora species, *Anthocercis gracilis* (T) has a moderate likelihood of occurring in the Holyoake East survey area. Six threatened flora species, *Diuris purdiei* (T), *Diuris micrantha* (T), *Thelymitra stellata* (T), *Verticordia fimbrilepis* subsp. *fimbrilepis* (T), *Lasiopetalum pterocarpum* (T) and *Thelymitra dedmaniarum* (T), have a low likelihood of occurring in the Holyoake East survey area. Seven priority flora species had a moderate likelihood of occurring in the Holyoake East survey area, Appendix C and Figure 8. Four priority flora have a high likelihood of occurrence (*Hakea oldfieldii* P3, *Hemigenia microphylla* P3, *Lasiopetalum cardiophyllum* P4 and *Senecio leucoglossus* P4), mainly due to previous records in the area or in adjacent areas and suitable habitat. An additional 11 priority flora species (one Priority 2, six Priority 3 and four Priority 4 species) have the potential to occur in the area.



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Holyoake East - Priority Areas
Potential Threatened and Priority Flora

Figure: **8**

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

A total of 80 introduced taxa have the potential to occur in the Holyoake East survey area (Appendices B and D). Six of the introduced species are declared pest organisms pursuant to section 22 of the BAM Act. Four of the introduced taxa are listed Weeds of National Significance. Some of these species may not occur in the less disturbed forest areas and as such reflect the wide radial approach to database searches.

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

- Known records within a 40 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).

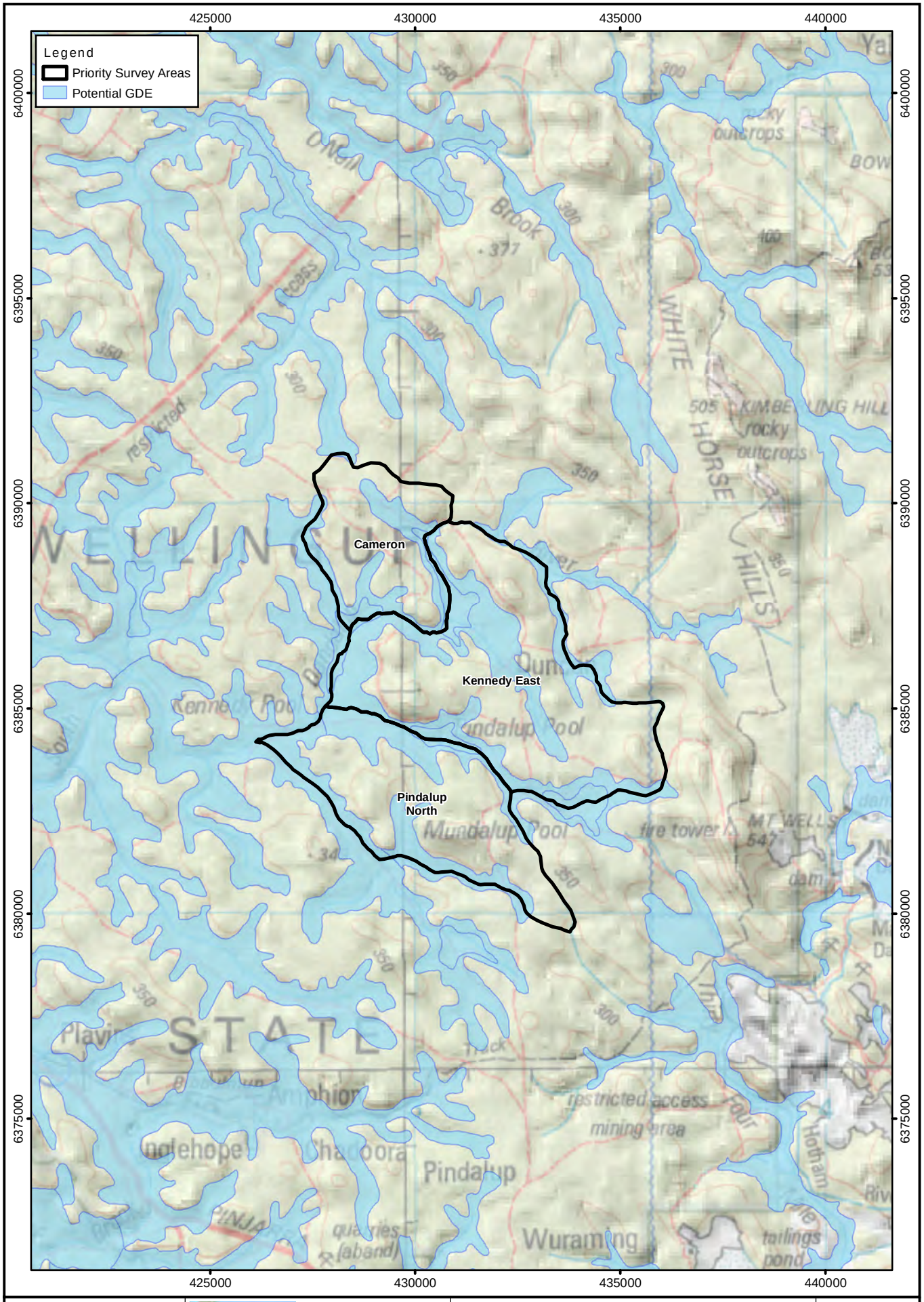
The likelihood was ranked Low, Moderate or High.

Based on this assessment, eight of the significant weed species had a high likelihood, and eighteen weed species had a moderate likelihood, of occurring in the Holyoake East survey area. The majority of the weeds with moderate or high likelihood are relatively short lived species that will not compete with native species unless the vegetation is cleared or disturbed.

4.6. Groundwater Dependant Ecosystems

The potential groundwater dependent ecosystems were determined on the basis of the extent of the vegetation complexes (Yarragil 1, Yarragil 2, Pindalup 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 rudis, Hypocalymma angustifolium, Melaleuca preissiana, Melaleuca viminea* and *Taxandria linearifolia.*



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Holyoake East - Priority Areas
Potential GDE

Figure:
9

4.7. Old Growth Forests

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

Due to the proximity of the Dwellingup as a forestry township it 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 Holyoake East survey area, see Figure 11. These results as supplied by DBCA reflect the degree of logging in the Holyoake East survey area in the last few decades. Some of the valley areas have not been logged for some time and as such reflect the linear patterns of these systems.

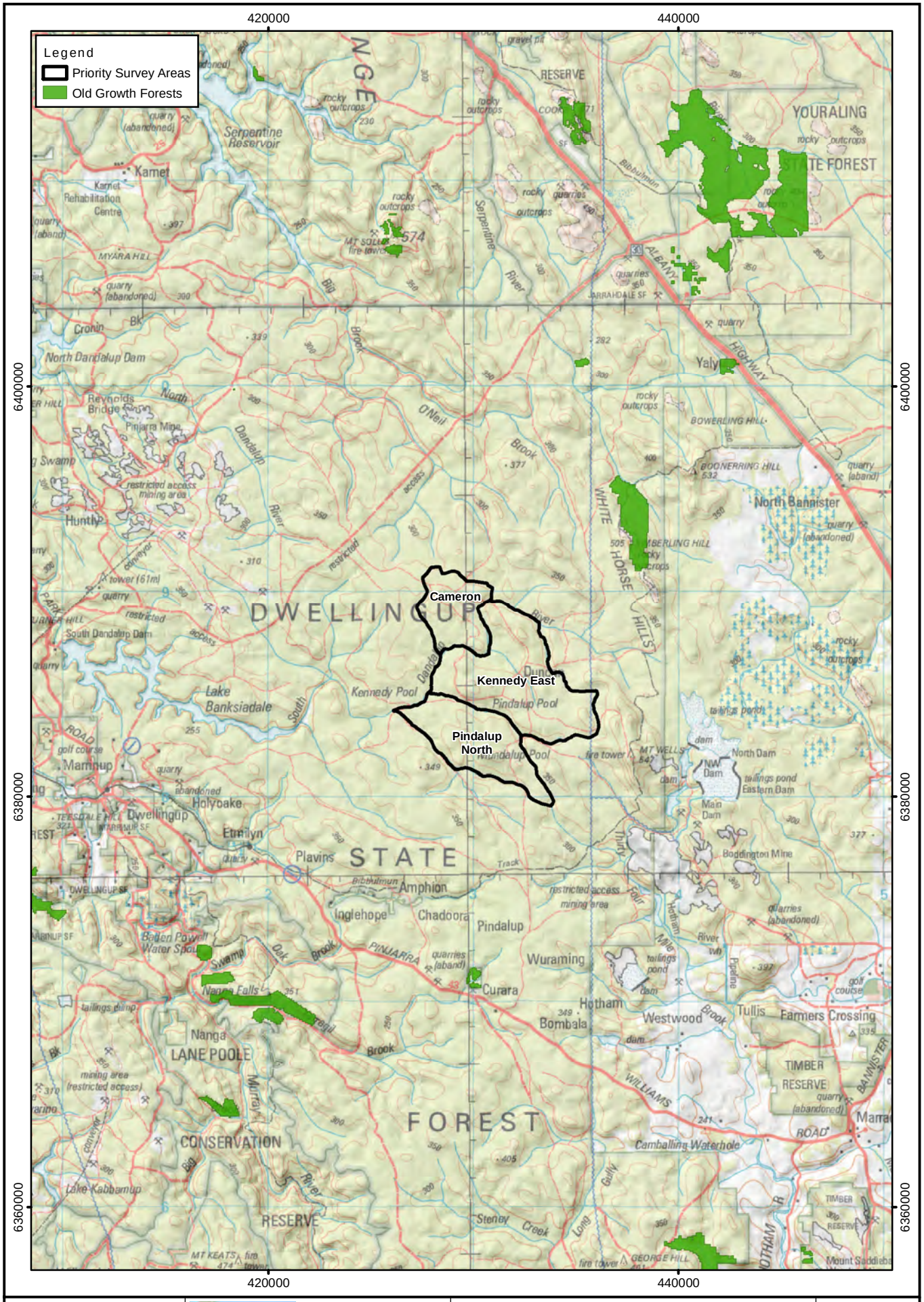
4.8. Previous Surveys

Mattiske Consulting has previously mapped the vegetation in the areas surrounding the Holyoake East survey area. Recent flora and vegetation studies relevant to the Holyoake East survey area include the previous flora and vegetation studies and transect monitoring has been done in the 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 Holyoake East areas(Mattiske Consulting Pty Ltd 2021).

4.9. 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 (2023e) or at State level pursuant to Part 2 of the *BC Act* and as listed by DBCA (2023b) with the potential to occur within the Holyoake East survey area.

There are no priority ecological communities (PECs), as listed at State level by DBCA (2023a) with the potential to occur within the Holyoake East survey area. Although there are communities associated with granite outcrop areas that have been listed as PEC's at the State level to the north and east, on the basis of the database searches and previous observations, the occurrence of granite outcrops in the Holyoake East survey area is likely to be much lower and if present more localised in extent.



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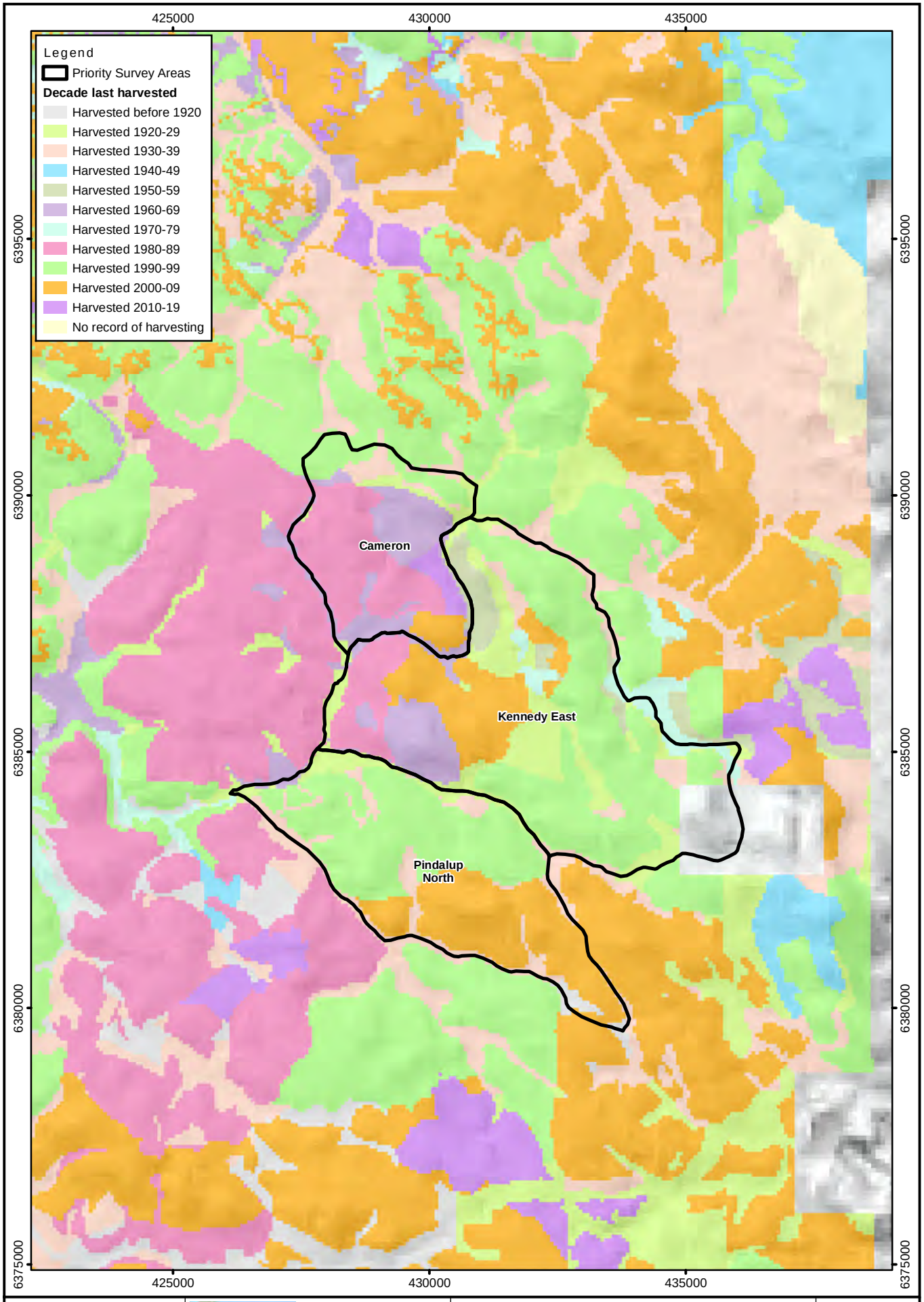
Holyoake East - Priority Areas
Old Growth Forest

Figure:
10



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Holyoake East - Priority Areas
Harvested Year

Figure:

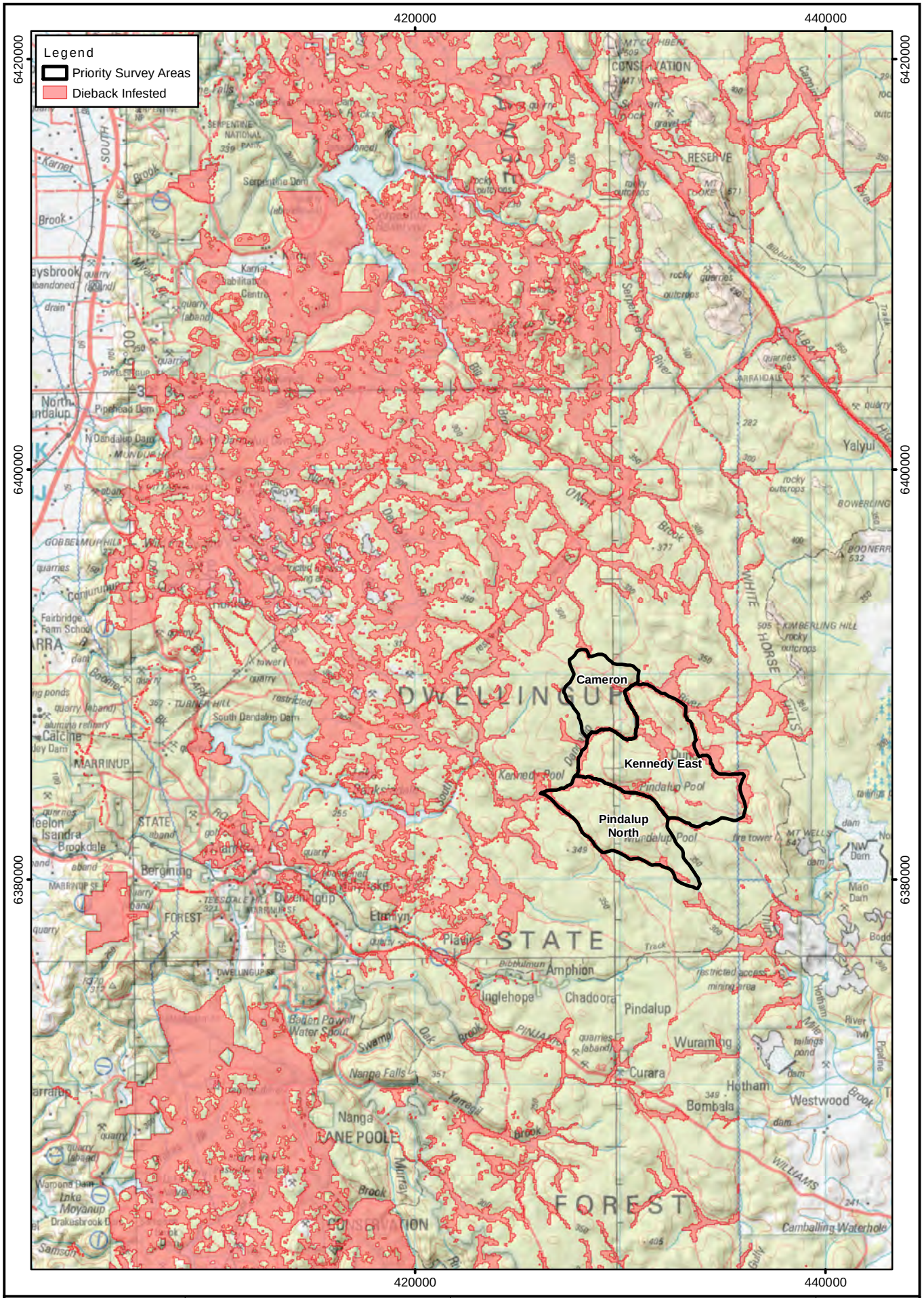
11

4.10. 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 2023f). 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 2023f). Whilst these potential values were recognized in the National database search (DCCEEW 2023f) these wetlands occur west of the survey area and not in the Holyoake East survey area.

4.11. 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 Holyoake East survey area. Sections of the Holyoake East survey area have been infested with the Dieback disease caused by *Phytophthora cinnamomi*. In other areas of 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 Holyoake East survey area.



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Holyoake East - Priority Areas
Dieback

Figure:
12

5. RESULTS FROM FIELD STUDIES

5.1. Survey Effort

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

- Targeted flora and vegetation mapping was undertaken over a seven month period from January 2023 to August 2023 on 37 days of mapping with a total of 203 person days.
- Targeted work and permanent plots were established in December 2022 was undertaken by 4 personnel over 3 days.
- Previous flora and vegetation studies and transect monitoring has been done in the Cameron block (including the sub-catchment Gordon) since 1993 (E.M. Mattiske and Associates 1993 to 1994; and Mattiske Consulting 1996 to 2006). Three of the Gordon transects have been included in the survey effort summaries.

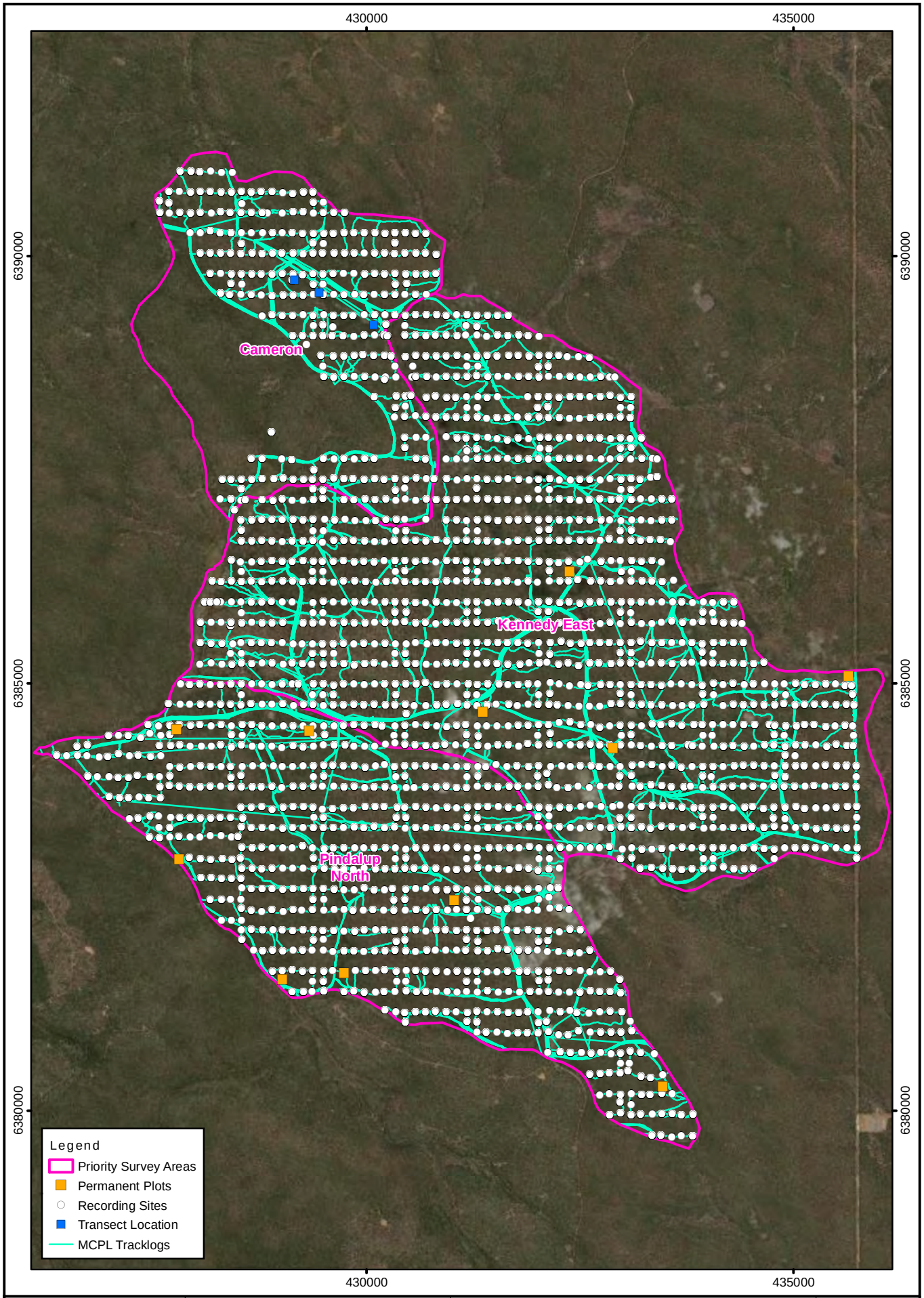
The main limitation was related to the area in the northwest that had been burnt just prior to survey work which resulted in an absence of understorey species. Consequently it was necessary to extrapolate from previous mapping to the west and north-west and from the current mapping. This area is apparent from Figure 13 where there is a gap in the recording site coverage of the area.

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.

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

Site-vegetation Type	No Recording Sites	Cameron (ha)	Kennedy East (ha)	Pindalup North (ha)	Total Area (ha)
A	100	32.84	186.78	75.91	295.53
AC	12	32.03	-	3.28	35.31
C	1	4.53	-	-	4.53
CW	1	4.84	-	-	4.84
W	36	16.62	50.65	11.98	79.25
AD	27	-	63.46	24.02	87.48
DA	44	3.69	124	15.72	143.41
D	189	128.15	302.11	126.72	556.98
DG	2	-	3.96	-	3.96
PS	250	206.47	279.9	256.99	743.36
PT	138	65.47	181.71	116.13	363.31
PW	9	3.59	21.81	-	25.40
SW	39	13.52	60.85	10.13	84.50
S	487	268.26	757.71	424.4	1450.37
SP	18	57.93	-	-	57.93
ST	3	11.93	-	-	11.93
TS	420	70.07	520.85	432.24	1023.16
T	258	142.81	343.39	231.34	717.54
Z	12	33.54	-	-	33.54
CL	-	0.55	-	-	0.55
PL	1	-	8.26	-	8.26
Total	2047	1096.84	2905.44	1728.86	5731.14



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Holyoake - Priority Areas
Survey Effort

Figure:
13

5.2. Flora

A total of 474 vascular plant taxa, representative of 192 genera and 66 families (Appendix B), have been recorded in the Holyoake East survey area. The most commonly represented families were Fabaceae (65 taxa), Proteaceae (38 taxa), Asteraceae (39 taxa) and Myrtaceae (30 taxa). The most commonly represented genera were *Lomandra* (19 taxa), *Acacia* (18 taxa) and *Hibbertia* (15 taxa).

5.3. Threatened and Priority Flora

A total of 2 priority flora species (*Lasiopetalum cardiophyllum* P4 and *Senecio leucoglossus* P4) were recorded either within or near the Holyoake East survey area and a range extension of *Leucopogon darlingensis* subsp. *darlingensis* was recorded in the Holyoake East survey area. The location of the priority flora species and the range extension as recorded are summarized on Figure 14.

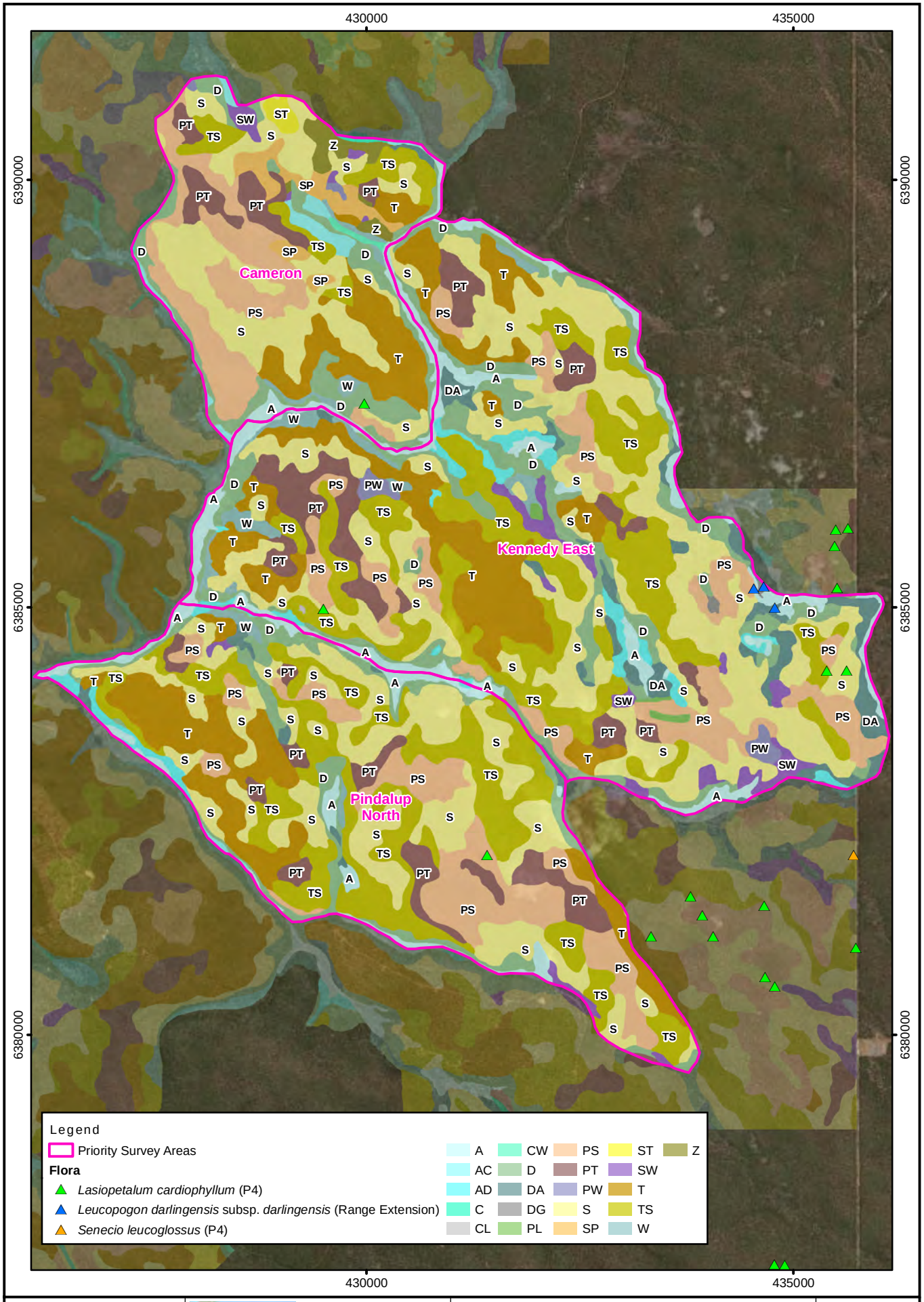
Lasiopetalum cardiophyllum (P4) has mainly been recorded on the eastern side of the northern Jarrah forest. Two specimens of this species were confirmed at the State Herbarium (ACC10469/E and ACC10556/E). This species tend to dominate the understorey when it occurs and in general mainly occurs in Jarrah-Marri-Sheoak (*Eucalyptus marginata – Corymbia calophylla – Allocasuarina fraseriana*) forests. This species was recorded at 22 locations within and near the Holyoake East survey area (Table 6). This species is known from 34 specimens at the State Herbarium (WAH 1998-). This species is distinguishable in non-flowering periods due to its characteristic leaf shape.

Senecio leucoglossus (P4) has mainly been recorded extensively as scattered plants through the northern Jarrah forest. One specimen of this species were confirmed at the State Herbarium (ACC10469/E). This species tends occur on lateritic soils and is known from 44 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 one location near the Holyoake East survey area, but has been recorded in other forest areas by the Mattiske team.

Leucopogon darlingensis subsp*. darlingensis* occurs as a range extension at three sites in block M4723 (see Figure 14) and as such is a southerly to south-westerly extension of known occurrences which mainly occur north east of Albany Highway in the eastern Jarrah forests and then near Mundaring. This sub-species is known from 35 collections at the State Herbarium (WAH 1998-). Several plants occurs at each location.

5.4. Introduced Species

A total of 28 introduced taxa were recorded in the Holyoake East survey area. None of the introduced species are declared pest organisms pursuant to section 22 of the BAM Act. None of the introduced taxa are listed Weeds of National Significance (DCCEEW 2023d). The majority of the introduced species are relatively short lived annuals.



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Scale: 1:60,000
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Holyoake East - Priority Areas
Vegetation

Figure:
14

5.5. Vegetation

A total of 19 site-vegetation types were defined and mapped in the Holyoake East survey area and an addition two mapping units (CL cleared land and PL – plantations), Table 6 and Figure 14. The site-vegetation types were defined on the basis of key species and site parameters as defined in Habel (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 Holyoake East survey area (namely PS, S, TS and T which together cover 68.65% of the survey area).

Table 6: Summary of site-vegetation types as defined for the Holyoake East 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.	295.53	5.16
	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.	35.31	0.62
	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.	87.48	1.53
	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.	143.41	2.50
	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.	556.98	9.72
	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.	3.96	0.07
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.	4.53	0.08
	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.	4.84	0.08
	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.	79.25	1.38
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.	84.50	1.47
	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.	25.40	0.44

Table 6: Summary of site-vegetation types as defined for the Holyoake East 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	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.	363.31	6.34
	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.	743.36	12.97
	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.	57.93	1.01
	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.	1450.37	25.31
	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.	11.93	0.21
	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.	1023.16	17.85
	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.	717.54	12.52
	Z	Open forest of *Eucalyptus marginata* and *Corymbia calophylla* over *Macrozamia riedlei, Xanthorrhoea preissii, Hakea lissocarpha* and *Phyllanthus calycinus* on sandy-loam to sandy-loam gravel soils on slopes.	33.54	0.59
Other Areas	CL	Cleared Areas	0.55	0.01
	PL	Plantation Areas (Pines)	8.26	0.14
	Total		5731.14	

None of these site-vegetation types are restricted to the Holyoake East 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 (2023e) or at State level pursuant to Part 2 of the *BC Act* and as listed by DBCA (2023b) within the Holyoake East survey area.

There are no priority ecological communities (PECs), as listed at State level by DBCA (2023a) within the Holyoake East survey area. At a State or National level none of the site-vegetation types have been listed as Threatened or Priority Ecological Communities.

5.6. Vegetation Condition

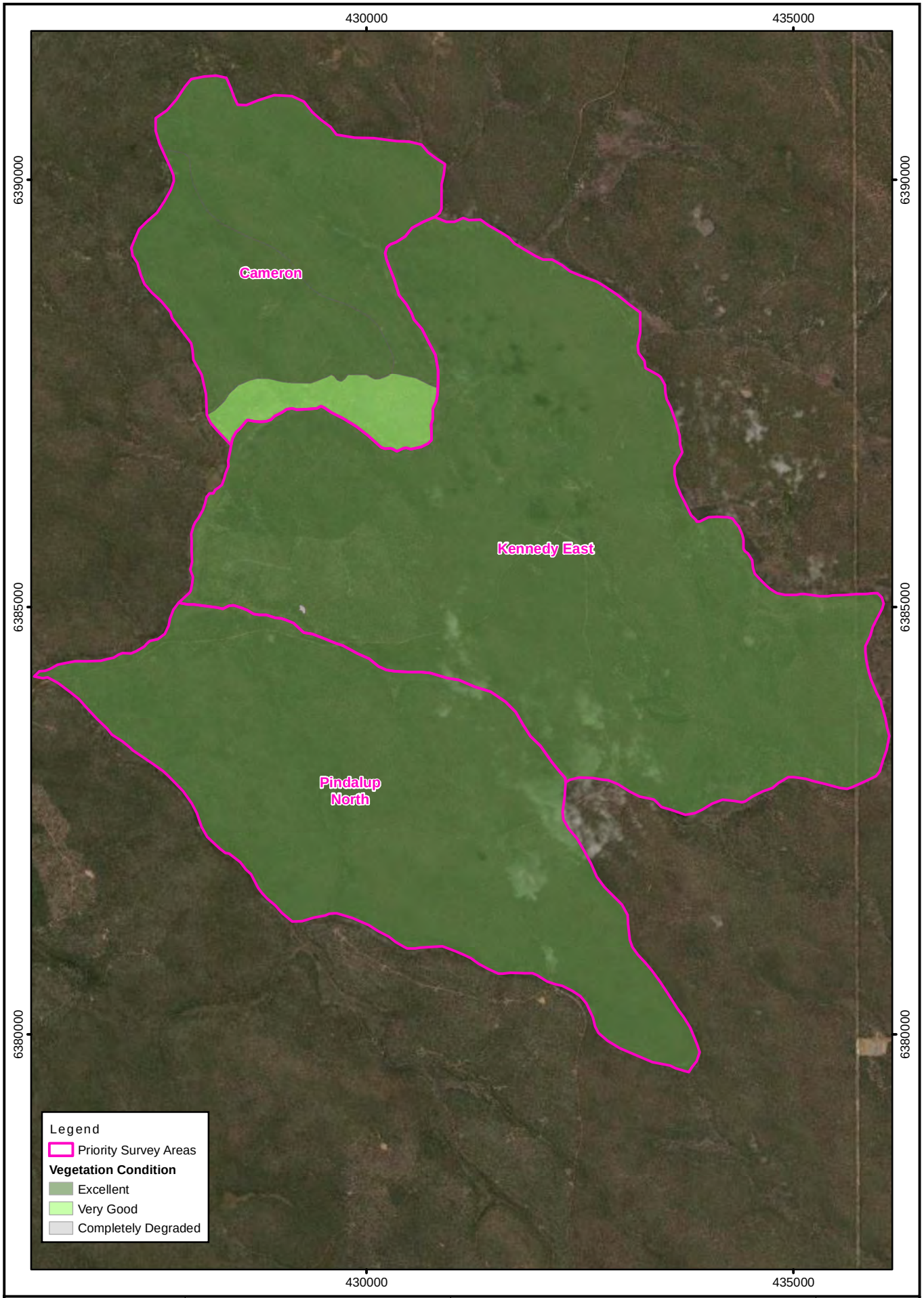
The vast majority of the Holyoake East survey area is in excellent condition, Figure 15. A small section in the southern part of Cameron had been logged and the northwest section had been subjected to a recent fire event.

5.7. Stump Observations

The number of stumps recorded in the 20m radius around each recording site is summarized in Figure 16. It is apparent that there are patches of forest supporting denser numbers of stumps with more than 4 stumps per 20m radius of recording sites. This data reflects the usage of the area for logging over many years.

5.8. Potential Habitat Trees

The potential habitat trees (based on the number of trees with diameters at breast height greater than 50cm) within the 20m radius of the recording sites is summarized in Figure 17. The results indicate the majority of the recording sites supported at least 1 to 4 trees and that there were a few patches which supported more than 5 trees.



N

0 0.45 0.9 km

Scale: 1:60,000
MGA94 (Zone 50)

CAD Ref: a1992_F010_10_11

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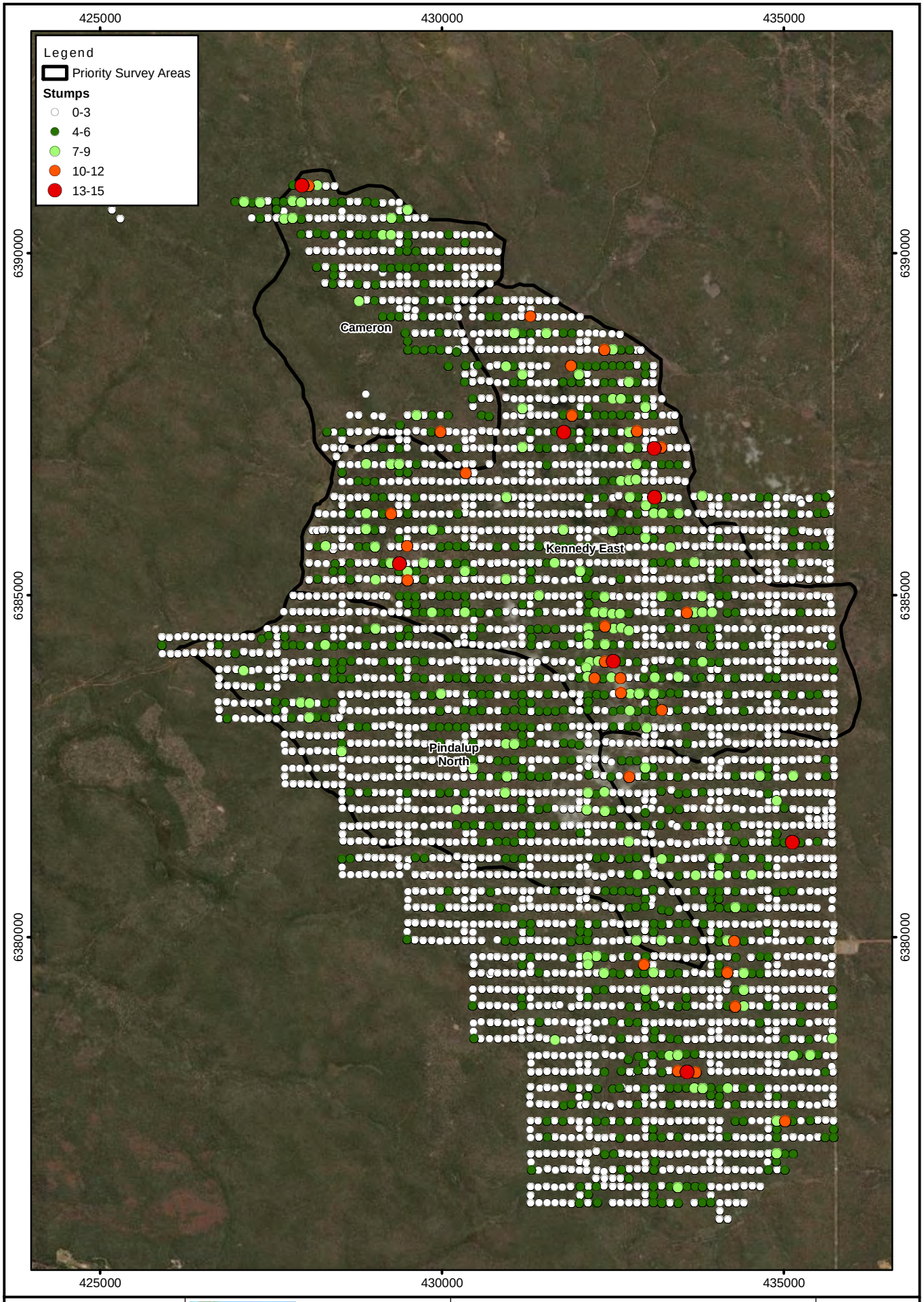
Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

Holyoake East - Priority Areas
Vegetation Condition

Figure:

15



N

0 0.55 1.1 km

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

CAD Ref: a1992_F029_13

Date: December 2023 | Rev: A | A4

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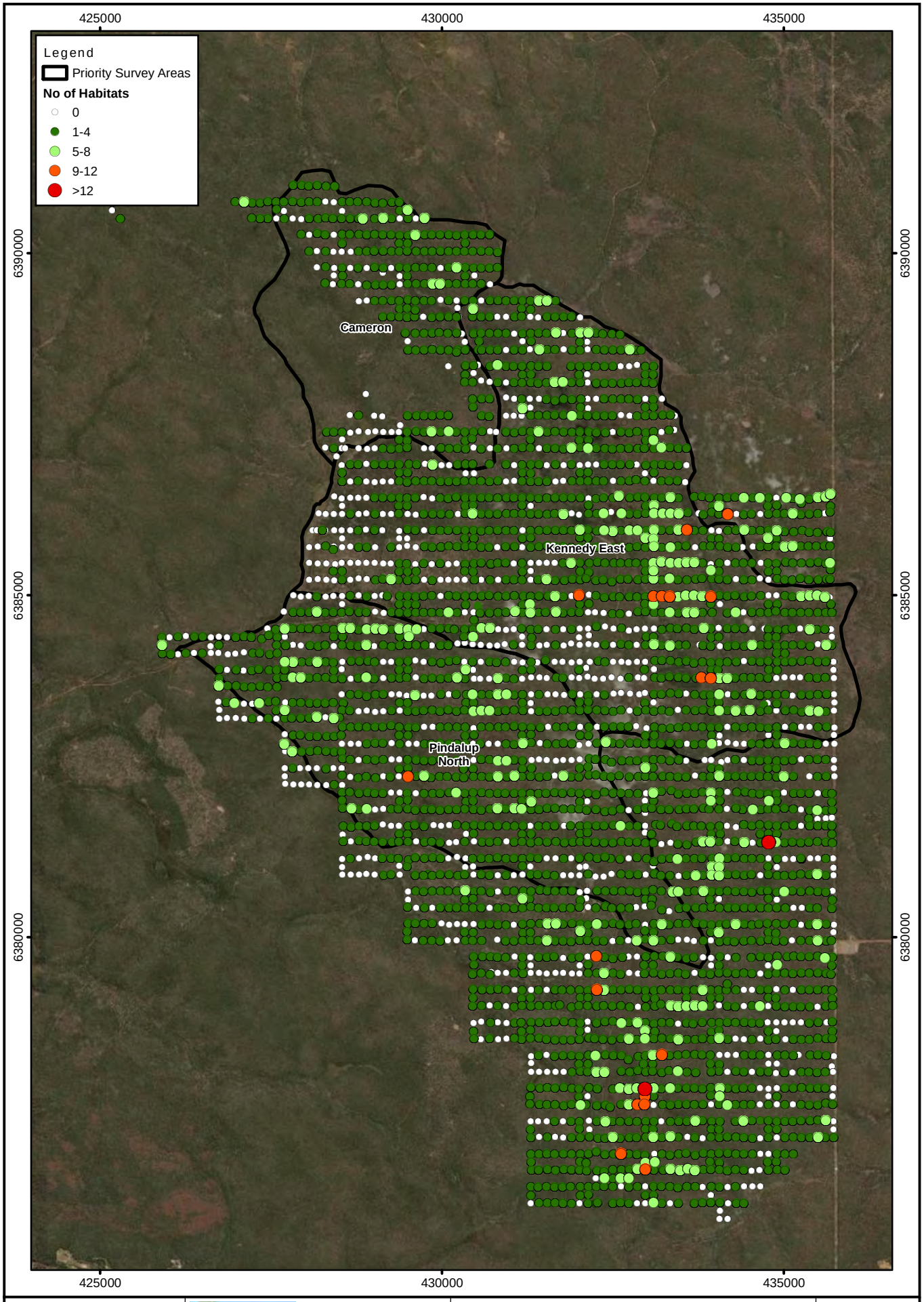
Holyoake - Priority Areas
MCPL Stumps

Figure:
16



N

0 0.55 1.1 km

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

CAD Ref: a1992_F029_14

Date: December 2023 | Rev: A | A4

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Holyoake - Priority Areas
Potential Habitat Trees

Figure: **17**

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 Holyoake East 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 2023 in line with some changes in nomenclature from 2022 to 2023.

The Holyoake East 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).

Potential Flora

A total of 860 vascular plant taxa, representative of 267 genera and 85 families (Appendix B), have the potential to occur within the Holyoake East survey area (Mattiske Consulting 2022). The most commonly represented families were Fabaceae (110 taxa), Orchidaceae (66 taxa), Myrtaceae (68 taxa) and Proteaceae (63 taxa). The most commonly represented genera were *Acacia* (40 taxa), *Stylidium* (29 taxa), *Hibbertia* (22 taxa) and *Drosera* (20 taxa).

A total of seven threatened flora species and 25 priority flora species have the potential to occur in the Holyoake East survey area. Of the threatened flora species, *Anthocercis gracilis* (T) is the only potential species and this species occurs on granite outcrops.

A total of 80 introduced taxa have the potential to occur in the Holyoake East survey area; with six of the introduced species being declared pest organisms pursuant to section 22 of the BAM Act (DPIRD 2023). Four of the introduced taxa are listed Weeds of National Significance (DCCEEW 2023d). Some of these species may not occur in the less disturbed forest areas and as such reflect the wide radial approach to database searches.

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 Holyoake East survey area. Although there are communities associated with granite outcrop areas that have been listed as PEC's at the State level to the north and east, on the basis of the database searches and previous observations, the occurrence of granite outcrops in the Holyoake East survey area is likely to be much lower and if present more localised in extent.

The Holyoake East survey area occurs within the Regional Forest Agreement (RFA) area of the southwest forests DCCEEW (2023b) 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 Holyoake East survey area. In view of the proximity of the Dwellingup as a forestry township it is unlikely that there will be additional old growth forests in the survey area. The Holyoake East has areas of dieback in some of the valley systems. The results for the dieback occurrence in these survey areas may also reflect the degree of sampling which is less intensive than in the western areas of the northern Jarrah forest.

Survey Effort

The survey effort in the Holyoake East survey areas includes data from the earlier transect studies within the northern valley systems to the more recent plots established on a range of the site-vegetation types within the survey area and the recording on a grid pattern and targeted searches across the survey area. The other aspect of the survey efforts relates to the coverage over a range of seasons in 2022 and 2023. The main limitation was related to a section of the north-west part of the survey area that had been burnt just prior to the proposed sampling. This latter area was mapped by extrapolating from the extensive nearby vegetation mapping; but there is an obvious need to revisit as soon as possible to undertake more detailed on site work.

In summary, the work undertaken to date on the Holyoake East 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

A total of 474 vascular plant taxa, representative of 192 genera and 66 families (Appendix B), have been recorded in the Holyoake East survey area. The most commonly represented families were Fabaceae (65 taxa), Proteaceae (38 taxa), Asteraceae (39 taxa) and Myrtaceae (30 taxa). The most commonly represented genera were *Lomandra* (19 taxa), *Acacia* (18 taxa) and *Hibbertia* (15 taxa).

A total of 2 priority flora species (*Lasiopetalum cardiophyllum* P4 and *Senecio leucoglossus* P4) were recorded either within or near the Holyoake East survey area and a range extension of *Leucopogon darlingensis* subsp. *darlingensis* was recorded in the Holyoake East survey area.

A total of 28 introduced taxa were recorded in the Holyoake East survey area. None of the introduced species are declared pest organisms pursuant to section 22 of the BAM Act (DPIRD 2023). None of the introduced taxa are listed Weeds of National Significance (DCCEEW 2023d). The majority of the introduced species are relatively short lived annuals.

Recorded Vegetation

A total of 19 site-vegetation types were defined and mapped in the Holyoake East survey area and an addition two mapping units (CL cleared land and PL – plantations). The site-vegetation types were defined on the basis of key species and site parameters as defined in Habel (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 Holyoake East survey area (namely PS, S, TS and T which together cover 68.65% of the survey area)**.**

None of these site-vegetation types are restricted to the Holyoake East 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 (2023e) or at State level pursuant to Part 2 of the *BC Act* and as listed by DBCA (2023b) within the Holyoake East survey area.

There are no priority ecological communities (PECs), as listed at State level by DBCA (2023a) within the Holyoake East survey area. At a State or National level none of the site-vegetation types have been listed as Threatened or Priority Ecological Communities.

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

The vast majority of the Holyoake East survey area is in excellent condition. A small section in the southern part of Cameron had been logged and the northwest section had been subjected to a recent fire event.

Based on data from Department of Biodiversity, Conservation and Attractions, there are no old growth forests occurring in the Holyoake East survey area. In view of the proximity of the Dwellingup as a forestry township it is unlikely that there will be additional old growth forests in the survey area.

6. ACKNOWLEDGEMENTS

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

7. PERSONNEL

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

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Mr L Rowles	Senior Botanist	Field Studies and Plant IDs	FB62000020-4,5
Mr Z Sims	Senior Botanist	Data collection and Field Studies	FB62000025-4,5
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Mr A Pereira	Experienced Botanist	Data collection and Field Studies	FB62000035-4, 145-5
Ms L Ducki	Experienced Botanist	Data collection and Field Studies	FB62000394, 2
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
Mr J C Mooney	Experienced Botanist	Data collection and Field Studies	FB62000416, 2
Ms A Rowe	Experienced Botanist	Data collection and field studies	FB62000329-2,3
Ms M Pollock	Botanist	Data collection and field studies	FB62000524
Ms J Marshall	Botanist	Data collection and field studies	FB62000572
Ms J Werny	Botanist	Data collection and field studies	FB62000587
Mr Z Gates	Botanist	Data collection and field studies	FB62000426
Ms K Craig/Smith	Botanist	Data collation, reporting	N/A
Ms B Farrar	Botanist	Data collation, reporting	N/A
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,2022a) and are categorised under Schedules 1-3**.** A flora species is defined as **threatened** if it is facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future, pursuant to sections 20, 21 and 22 of the BC Act. Threatened species are categorised as critically endangered, endangered, and vulnerable (Table A1.2).

Table A1.2 State definition of threatened flora species

Note: Adapted from DBCA (2022b).

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 2019b). 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 (2022b).

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

APPENDIX A2: THREATENED AND PRIORITY ECOLOGICAL COMMUNITY DEFINITIONS

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

Table A2.1 Federal definition of threatened ecological communities

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

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

Threatened ecological communities (TECs) are listed in the *List of Threatened Ecological Communities endorsed by the Western Australian Minister for Environment (28 June 2018)* (under Part 2, Division 2, Subdivision 1 of the BC Act; DBCA 2021c). 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 (2022b).

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 (2022d) in the *Priority Ecological Communities for Western Australia – Version 28 (17 January 2019)*. Similarly to priority flora, PECs are not afforded legislative protection, however are considered significant under the Environmental Protection Authority's (2016a) *Environmental Factor Guideline: Flora and Vegetation*. The Department of Biodiversity, Conservation and Attractions categorises priority ecological communities into five categories: Priority 1; Priority 2, Priority 3, Priority 4 and Priority 5 (Table A2.3).

Table A2.3 State definition of priority ecological communities

Note: Adapted from DBCA (2022b).

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

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

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

Under the *Biosecurity and Agriculture Management Regulations 2013* (WA), declared pest plants are placed in one of three control categories, C1 (exclusion), C2 (eradication) or C3 (management), which determines the measures of control which apply to the declared pest (Table A4.1). The current listing of declared pest organisms and their control category is through the Western Australian Organism List (Department of Primary Industries and Regional Development 2022).

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

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

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

APPENDIX A4: OTHER DEFINITIONS

Environmentally sensitive areas

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

Conservation significant flora

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

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

Conservation significant vegetation

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

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

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

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

Table A5.1 Definition of vegetation condition categories

Note: Adapted from Keighery (1994).

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

APPENDIX B: POTENTIAL VASCULAR PLANT SPECIES IN THE HOLYOAKE EAST AREA

Note: * denotes introduced species; T denotes threatened species; P1-P4 denotes priority species; SCC = State Conservation Code; FCC = Federal Conservation Code; CE = Critically Endangered, E = Endangered, V = Vulnerable.

Family	Species	SCC	FCC	Data source									
				EPBC	Naturemap	MCPL 2015a	MCPL 2015b	MCPL 2018	MCPL 2019b	MCPL 2019a	MCPL 2020	MCPL 2022, 2023	Permanent Forest
ALLIACEAE	* *Allium triquetrum*				x								
AMARANTHACEAE	*Ptilotus drummondii*										x	x	
	Ptilotus manglesii				x	x	x					x	
AMARYLLIDACEAE	* *Narcissus papyraceus*				x								
ANARTHRIACEAE	*Lyginia barbata*											x	
	Lyginia imberbis											x	
APIACEAE	*Actinotus glomeratus*												x
	Apium prostratum subsp. *prostratum* var. *prostratum*				x								
	Centella asiatica					x						x	
	Daucus glochidiatus				x							x	x
	Pentapeltis peltigera				x	x	x	x	x	x	x	x	x
	Pentapeltis silvatica							x	x				
	Platysace compressa						x	x	x	x	x	x	x
	Platysace filiformis				x		x		x			x	
	Platysace tenuissima				x		x	x	x			x	x
	Platysace sp.											x	
	Schoenolaena juncea											x	
	Xanthosia atkinsoniana				x		x	x		x	x	x	x
	Xanthosia candida				x	x	x	x	x	x	x	x	x
	Xanthosia ciliata								x				x
	Xanthosia huegelii					x	x		x	x		x	x
	Xanthosia singuliflora											x	
	Xanthosia sp.					x			x			x	
	Apiaceae sp.											x	
APOCYNACEAE	* *Gomphocarpus fruticosus*				x								x
	Parsonsia diaphanophleba	P4			x								
ARALIACEAE	*Hydrocotyle callicarpa*				x	x						x	x
	Hydrocotyle hirta				x								
	Trachymene pilosa				x	x		x	x	x		x	x
	Trachymene sp.											x	
ASPARAGACEAE	* *Asparagus asparagoides*			x									
	Laxmannia sessiliflora subsp. *australis*				x								
	Laxmannia squarrosa						x				x	x	x
	Laxmannia sp.						x						
	Lomandra brittanii					x	x			x		x	x
	Lomandra caespitosa				x	x	x	x		x	x	x	x
	Lomandra drummondii				x		x	x				x	x
	Lomandra hermaphrodita				x	x	x	x		x	x	x	x
	Lomandra integra				x		x					x	x
	Lomandra micrantha					x	x	x				x	x
	Lomandra micrantha subsp. *micrantha*				x	x	x					x	
	Lomandra nigricans				x		x			x	x	x	x
	Lomandra odora												x
	Lomandra pauciflora											x	
	Lomandra preissii										x	x	x
	Lomandra purpurea				x		x	x			x	x	x
	Lomandra sericea				x		x	x	x		x	x	x
	Lomandra sonderi				x		x	x	x	x	x	x	x

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Note: * denotes introduced species; T denotes threatened species; P1-P4 denotes priority species; SCC = State Conservation Code; FCC = Federal Conservation Code; CE = Critically Endangered, E = Endangered, V = Vulnerable.

Family	Species	SCC	FCC	Data source									
				EPBC	Naturemap	MCPL 2015a	MCPL 2015b	MCPL 2018	MCPL 2019b	MCPL 2019a	MCPL 2020	MCPL 2022, 2023	Permanent Forest
ASPARAGACEAE (continued)	*Lomandra spartea*				x	x	x	x	x		x	x	x
	Lomandra suaveolens							x	x				
	Lomandra sp.				x	x	x	x	x	x	x	x	x
	Lomandra sp. 1											x	
	Lomandra sp. 2											x	
	Lomandra sp. 3											x	
	Lomandra sp. 4											x	
	Thysanotus anceps	P3			x								
	Thysanotus dichotomus				x		x	x	x	x		x	x
	Thysanotus fastigiatus				x			x	x			x	x
	Thysanotus manglesianus				x				x			x	x
	Thysanotus multiflorus					x	x	x	x		x	x	x
	Thysanotus patersonii				x							x	
	Thysanotus sparteus											x	
	Thysanotus tenellus					x						x	
	Thysanotus thyrsoideus				x	x	x	x	x			x	x
	Thysanotus sp.					x	x					x	x
ASTERACEAE	* *Arctotheca calendula*											x	
	Brachyscome iberidifolia				x							x	
	* *Chrysanthemoides monilifera*			x									
	* *Chrysanthemoides monilifera* subsp. *monilifera*			x									
	Craspedia variabilis				x	x						x	
	* *Dittrichia graveolens*											x	
	* *Erigeron sumatrensis*								x			x	
	* *Erigeron* sp.											x	
	Euchiton collinus				x								
	Euchiton sphaericus											x	
	* *Gamochaeta calviceps*											x	
	Hyalosperma cotula				x							x	
	Hyalosperma demissum				x								x
	Hyalosperma sp.											x	
	* *Hypochaeris glabra*				x	x	x		x	x	x	x	x
	* *Hypochaeris radicata*				x								
	* *Lactuca serriola* forma *serriola*				x								
	Lagenophora huegelii				x	x	x	x	x	x	x	x	x
	Lawrencella rosea											x	
	Millotia tenuifolia				x	x					x	x	x
	Millotia tenuifolia var. *tenuifolia*					x						x	
	Olearia paucidentata				x				x				
	Olearia sp. Eremicola (Diels & Pritzel s.n. PERTH 00449628)											x	
	Panaetia lessonii				x							x	
	Podolepis gracilis				x							x	x
	Podotheca angustifolia				x							x	x
	* *Pseudognaphalium luteoalbum*											x	
	Pterochaeta paniculata				x		x	x	x		x	x	x
	Quinetia urvillei				x							x	x
	Rhodanthe citrina												x
	Rhodanthe corymbosa				x								
	Rhodanthe sp.											x	
	Senecio diaschides				x	x	x	x	x			x	
	Senecio hispidulus						x	x		x	x	x	x
	Senecio leucoglossus	P4			x		x		x	x	x	x	x
	Senecio multicaulis subsp. *multicaulis*				x								
	Senecio pinnatifolius												x
	Senecio quadridentatus						x	x	x		x	x	x

APPENDIX B: POTENTIAL VASCULAR PLANT SPECIES IN THE HOLYOAKE EAST AREA

Note: * denotes introduced species; T denotes threatened species; P1-P4 denotes priority species; SCC = State Conservation Code; FCC = Federal Conservation Code; CE = Critically Endangered, E = Endangered, V = Vulnerable.

Family	Species	SCC	FCC	Data source									
				EPBC	Naturemap	MCPL 2015a	MCPL 2015b	MCPL 2018	MCPL 2019b	MCPL 2019a	MCPL 2020	MCPL 2022, 2023	Permanent Forest
ASTERACEAE (continued)	* *Senecio vulgaris*							x				x	
	Senecio sp.						x	x	x	x	x	x	
	Siloxerus filifolius				x							x	
	Siloxerus humifusus											x	
	* *Sonchus asper*				x								
	* *Sonchus oleraceus*							x				x	
	* *Sonchus* sp.											x	
	Trichocline spathulata				x		x	x	x	x	x	x	x
	* *Ursinia anthemoides*						x					x	x
	* *Vellereophyton dealbatum*				x		x						
	Asteraceae sp.						x		x			x	
	Asteraceae sp. 1											x	
	Asteraceae sp. 2											x	
	Asteraceae sp. 3											x	
BORYACEAE	*Borya sphaerocephala*				x				x			x	
BRASSICACEAE	* *Sisymbrium officinale*				x								
	Lepidium sp.											x	
CAMPANULACEAE	*Isotoma hypocrateriformis*							x				x	x
	Isotoma scapigera											x	
	Lobelia anceps											x	
	Lobelia gibbosa								x			x	
	Lobelia heterophylla											x	
	Lobelia rhombifolia				x								x
	Lobelia rhytidosperma				x								
	Lobelia tenuior				x								
	Lobelia sp.										x	x	
	* *Wahlenbergia capensis*											x	
	Wahlenbergia preissii												x
	Wahlenbergia sp.											x	
CARYOPHYLLACEAE	* *Stellaria media*				x								
	* *Petrorhagia dubia*											x	
	Caryophyllaceae sp.											x	
CASUARINACEAE	*Allocasuarina fraseriana*				x		x	x	x		x	x	x
	Allocasuarina huegeliana											x	
	Allocasuarina humilis											x	
	Allocasuarina sp.								x			x	
CELASTRACEAE	*Stackhousia monogyna*						x	x	x	x		x	x
	Stackhousia pubescens				x								
	Stackhousia sp.								x		x		
	Tripterococcus brunonis						x					x	
CENTROLEPIDACEAE	*Aphelia cyperoides*					x							
	Centrolepis aristata					x						x	x
	Centrolepis mutica				x								
	Centrolepis pilosa												x
	Centrolepis polygyna				x								
	Centrolepis sp.											x	
CHENOPODIACEAE	* *Chenopodium album*				x								
	* *Chenopodium murale*				x								

APPENDIX B: POTENTIAL VASCULAR PLANT SPECIES IN THE HOLYOAKE EAST AREA

Note: * denotes introduced species; T denotes threatened species; P1-P4 denotes priority species; SCC = State Conservation Code; FCC = Federal Conservation Code; CE = Critically Endangered, E = Endangered, V = Vulnerable.

Family	Species	SCC	FCC	Data source									
				EPBC	Naturemap	MCPL 2015a	MCPL 2015b	MCPL 2018	MCPL 2019b	MCPL 2019a	MCPL 2020	MCPL 2022, 2023	Permanent Forest
COLCHICACEAE	*Burchardia congesta*				x	x	x	x	x	x		x	x
	Burchardia multiflora				x			x					
	Wurmbea dioica subsp. *alba*				x								
	Wurmbea sp.						x						
CRASSULACEAE	*Crassula colorata*											x	
CUPRESSACEAE	*Callitris ?acuminata*						x						
	* *Callitris endlicheri*				x								
CYPERACEAE	*Cyathochaeta avenacea*						x		x		x	x	x
	Cyathochaeta teretifolia	P3					x						
	* *Cyperus congestus*				x								
	* *Cyperus tenellus*											x	
	Gahnia aristata				x								
	Gahnia decomposita				x	x	x	x	x	x	x	x	
	Gahnia trifida				x		x	x					
	Lepidosperma apricola sens. lat.						x						
	Lepidosperma costale				x								
	Lepidosperma gracile						x					x	
	Lepidosperma leptostachyum						x						x
	Lepidosperma longitudinale				x								
	Lepidosperma persecans				x								
	Lepidosperma pubisquameum				x		x						
	Lepidosperma resinosum						x						
	Lepidosperma squamatum				x		x	x	x	x	x	x	x
	Lepidosperma tenue						x	x	x		x	x	
	Lepidosperma tetraquetrum				x	x	x	x	x	x	x	x	
	Lepidosperma sp.						x		x		x	x	
	Machaerina rubiginosa				x								
	Machaerina sp.										x		
	Mesomelaena tetragona											x	
	Morelotia octandra					x	x	x	x	x	x	x	x
	Netrostylis sp. Jarrah Forest (R. Davis 7391)				x	x	x	x	x	x	x	x	x
	Schoenus tenellus											x	
	Tricostularia compressa				x								
	Cyperaceae sp.						x		x		x	x	
DASYPOGONACEAE	*Kingia australis*						x	x	x			x	
DENNSTAEDTIACEAE	*Pteridium esculentum*					x	x	x	x	x	x	x	x
	Pteridium esculentum subsp. *esculentum*				x								
DILLENIACEAE	*Hibbertia acerosa*				x		x		x			x	x
	Hibbertia amplexicaulis				x	x	x	x	x	x	x	x	x
	Hibbertia commutata				x	x	x	x	x	x	x	x	x
	Hibbertia diamesogenos				x								
	Hibbertia glomerata												x
	Hibbertia glomerata subsp. *glomerata*				x			x					
	Hibbertia huegelii											x	
	Hibbertia hypericoides						x	x	x		x	x	
	Hibbertia hypericoides subsp. *hypericoides*				x								
	Hibbertia lasiopus											x	x
	Hibbertia ovata				x		x	x	x		x	x	x
	Hibbertia aff. *ovata*											x	
	Hibbertia perfoliata				x	x	x	x	x	x	x	x	x

APPENDIX B: POTENTIAL VASCULAR PLANT SPECIES IN THE HOLYOAKE EAST AREA

Note: * denotes introduced species; T denotes threatened species; P1-P4 denotes priority species; SCC = State Conservation Code; FCC = Federal Conservation Code; CE = Critically Endangered, E = Endangered, V = Vulnerable.

Family	Species	SCC	FCC	Data source									
				EPBC	Naturemap	MCPL 2015a	MCPL 2015b	MCPL 2018	MCPL 2019b	MCPL 2019a	MCPL 2020	MCPL 2022, 2023	Permanent Forest
DILLENIACEAE (continued)	*Hibbertia pilosa*											x	
	Hibbertia quadricolor				x								x
	Hibbertia semipilosa											x	
	Hibbertia serrata				x		x						
	Hibbertia silvestris				x			x	x		x	x	x
	Hibbertia stellaris				x								
	Hibbertia subvaginata				x			x			x	x	x
	Hibbertia vaginata											x	
	Hibbertia sp.				x		x	x	x	x		x	
DROSERACEAE	*Drosera bulbosa*					x						x	
	Drosera bulbosa subsp. *bulbosa*				x								
	Drosera calycina				x								
	Drosera drummondii				x								
	Drosera erythrorhiza				x	x	x	x	x	x		x	x
	Drosera gigantea							x					
	Drosera glanduligera				x								
	Drosera leucoblasta					x			x				
	Drosera macrantha												x
	Drosera menziesii												x
	Drosera occidentalis	P4			x								
	Drosera pallida				x					x			x
	Drosera platystigma											x	x
	Drosera rosulata				x								
	Drosera stolonifera				x	x			x				
	Drosera sp. Branched Styles (S.C. Coffey 193)				x								
	Drosera sp. (climbing)						x					x	
	Drosera sp.				x	x	x	x	x	x	x	x	x
	Drosera sp. 1											x	
	Drosera sp. 2											x	
ELAEOCARPACEAE	*Tetratheca hirsuta*					x	x	x	x			x	x
	Tetratheca hirsuta subsp. *hirsuta*				x								
	Tetratheca hirsuta subsp. *viminea*				x							x	
	Tetratheca hispidissima				x								
	Tetratheca nuda					x							
	Tetratheca setigera				x								
	Tetratheca similis	P3			x								
	Tetratheca virgata										x		
	Tetratheca sp.								x			x	
	Tremandra diffusa				x			x					
	Tremandra stelligera											x	
ERICACEAE	*Andersonia aristata*				x								
	Andersonia latiflora				x								x
	Andersonia lehmanniana											x	x
	Andersonia sp. Audax (F. Hort, B. Hort & J. Hort 3179)	P3			x								
	Andersonia sp.						x		x				
	Leucopogon australis							x				x	
	Leucopogon capitellatus				x		x	x	x	x	x	x	x
	Leucopogon cordatus				x								
	Leucopogon darlingensis subsp. *darlingensis*	RE			x							x	
	Leucopogon glabellus				x								
	Leucopogon gracillimus						x						
	Leucopogon pulchellus				x								
	Leucopogon verticillatus				x		x	x	x	x	x	x	x

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				EPBC	Naturemap	MCPL 2015a	MCPL 2015b	MCPL 2018	MCPL 2019b	MCPL 2019a	MCPL 2020	MCPL 2022, 2023	Permanent Forest
ERICACEAE	*Leucopogon* sp.						x		x				x
(continued)	*Styphelia concinna*				x				x				
	Styphelia discolor				x		x	x	x	x	x	x	x
	Styphelia epacridis				x							x	
	Styphelia nitens				x	x	x		x		x	x	x
	Styphelia pallida				x	x	x	x	x	x	x	x	
	Styphelia propinqua				x		x	x	x	x	x	x	x
	Styphelia stricta				x								
	Styphelia tenuiflora				x		x	x	x	x	x	x	x
	Styphelia tortifolia												
	Styphelia sp.						x	x	x			x	
	Ericaceae sp.						x					x	
EUPHORBIACEAE	*Amperea simulans*						x					x	
	Monotaxis grandiflora								x			x	x
	Monotaxis occidentalis				x		x	x	x			x	x
	Monotaxis sp.						x						
	Ricinocarpos graniticus				x								
	Stachystemon vermicularis				x								x
	Stachystemon ?vermicularis											x	
	Euphorbiaceae sp.						x					x	
FABACEAE	*Acacia alata*						x	x	x			x	
	Acacia alata var. *alata*				x		x				x		
	Acacia applanata				x							x	
	Acacia browniana				x		x	x	x	x	x	x	
	Acacia browniana var. *browniana*				x		x						
	Acacia browniana var. *endlicheri*							x					
	Acacia browniana var. *obscura*				x		x						
	Acacia celastrifolia				x		x		x			x	
	* *Acacia decurrens*				x								
	Acacia dentifera				x							x	
	Acacia divergens				x		x	x	x	x	x	x	
	Acacia drummondii												x
	Acacia drummondii subsp. *candolleana*				x		x	x	x	x	x	x	
	Acacia drummondii subsp. *drummondii*						x	x	x	x	x	x	
	Acacia extensa				x		x	x	x	x	x	x	
	Acacia horridula	P3			x								
	Acacia incurva				x							x	
	Acacia insolita subsp. *insolita*				x								
	Acacia lateriticola				x		x	x	x		x	x	x
	* *Acacia longifolia* subsp. *longifolia*				x								
	Acacia myrtifolia				x				x				
	Acacia nervosa				x		x		x		x	x	
	Acacia oncinophylla subsp. *oncinophylla*	P3			x								
	* *Acacia podalyriifolia*				x								
	Acacia preissiana				x		x		x				
	Acacia pulchella					x	x	x	x	x	x	x	x
	Acacia pulchella var. *glaberrima*				x								
	Acacia pulchella var. *goadbyi*				x								
	Acacia pulchella var. *pulchella*				x	x							
	* *Acacia pycnantha*								x				
	Acacia saligna				x							x	
	Acacia saligna subsp. Tweed River (B.R. Maslin 8596)				x								
	Acacia stenoptera				x								
	Acacia teretifolia				x								
	Acacia tetragonocarpa							x					

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				EPBC	Naturemap	MCPL 2015a	MCPL 2015b	MCPL 2018	MCPL 2019b	MCPL 2019a	MCPL 2020	MCPL 2022, 2023	Permanent Forest
FABACEAE (continued)	*Acacia urophylla*				x		x	x	x	x	x	x	x
	Acacia varia											x	
	Acacia varia var. *varia*								x				
	Acacia willdenowiana				x		x	x	x			x	
	Acacia sp.					x	x					x	x
	Aotus cordifolia				x								
	Bossiaea angustifolia				x							x	
	Bossiaea aquifolium						x	x			x	x	x
	Bossiaea aquifolium subsp. *aquifolium*				x				x	x			
	Bossiaea eriocarpa				x		x					x	
	Bossiaea modesta	P2			x								
	Bossiaea ornata				x	x	x	x	x	x	x	x	x
	Callistachys lanceolata						x					x	
	Chorizema cordatum				x			x	x	x	x	x	x
	Chorizema dicksonii								x			x	
	Chorizema nanum				x								
	Chorizema rhombeum				x							x	x
	Chorizema ulotropis	P4			x								
	Daviesia brachyphylla				x								
	Daviesia cordata				x				x	x		x	
	Daviesia costata				x								x
	Daviesia decurrens						x		x			x	x
	Daviesia decurrens subsp. *decurrens*				x								
	Daviesia horrida											x	
	Daviesia incrassata											x	
	Daviesia longifolia				x								
	Daviesia physodes				x							x	x
	Daviesia preissii				x		x		x			x	
	Daviesia rhombifolia				x			x				x	x
	Daviesia sp.								x			x	
	Dillwynia laxiflora				x								
	Euchilopsis linearis				x								
	Eutaxia parvifolia											x	
	Eutaxia virgata											x	
	Gastrolobium bilobum				x							x	
	Gastrolobium calycinum				x							x	
	Gastrolobium cuneatum				x								
	Gastrolobium ebracteolatum											x	
	Gastrolobium spinosum					x						x	
	Gastrolobium villosum											x	
	?*Gastrolobium* sp.						x						
	* *Genista* sp. X *Genista monspessulana*			x									
	Gompholobium confertum											x	x
	Gompholobium knightianum						x	x	x			x	
	Gompholobium marginatum				x	x	x	x	x	x		x	x
	Gompholobium polymorphum				x		x		x	x		x	x
	Gompholobium preissii				x				x			x	x
	Gompholobium tomentosum						x					x	
	Gompholobium sp.								x			x	
	Hardenbergia comptoniana						x					x	
	Hovea chorizemifolia				x		x	x	x	x	x	x	x
	Hovea trisperma				x	x	x		x			x	x
	Hovea sp.							x				x	x
	Isotropis cuneifolia				x								
	Isotropis cuneifolia subsp. *cuneifolia*											x	
	Jacksonia furcellata				x			x	x			x	

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				EPBC	Naturemap	MCPL 2015a	MCPL 2015b	MCPL 2018	MCPL 2019b	MCPL 2019a	MCPL 2020	MCPL 2022, 2023	Permanent Forest
FABACEAE (continued)	*Jacksonia sternbergiana*												
	Kennedia coccinea				x		x	x	x	x	x	x	x
	Kennedia prostrata				x	x		x	x	x	x	x	
	Labichea punctata						x	x	x	x	x	x	x
	* *Lathyrus latifolius*				x								
	* *Lotus uliginosus*												x
	Mirbelia dilatata				x		x	x	x	x	x	x	x
	Paraserianthes lophantha						x	x	x	x	x	x	
	Paraserianthes lophantha subsp. *lophantha*				x	x							
	Pultenaea reticulata				x								
	Sphaerolobium linophyllum											x	
	Sphaerolobium medium				x			x	x	x	x	x	x
	Sphaerolobium vimineum				x								
	Templetonia drummondii				x		x						
	Templetonia sp.										x	x	
	* *Trifolium dubium*												x
	* *Trifolium* sp.											x	
	Fabaceae sp.											x	
GENTIANACEAE	* *Centaurium erythraea*				x							x	
	* *Centaurium tenuiflorum*											x	
	Schenkia australis											x	
GERANIACEAE	*Pelargonium littorale*											x	
GOODENIACEAE	*Dampiera alata*											x	
	Dampiera hederacea								x				
	Dampiera linearis				x	x	x					x	x
	Dampiera sp.											x	
	Goodenia drummondii subsp. *megaphylla*				x								
	Goodenia micrantha											x	
	Goodenia ?pusilla											x	
	Goodenia trinervis				x								
	Goodenia sp.												x
	Lechenaultia biloba				x	x	x	x	x	x	x	x	x
	Scaevola calliptera				x	x	x	x	x			x	x
	Scaevola pilosa				x							x	x
	Scaevola repens var. *repens*											x	
	Scaevola sp.								x				
	Goodeniaceae sp.											x	
HAEMODORACEAE	*Anigozanthos bicolor*				x								
	Anigozanthos manglesii				x							x	
	Anigozanthos sp.										x	x	
	Conostylis aculeata											x	
	Conostylis aculeata subsp. *aculeata*				x							x	
	Conostylis pusilla				x				x			x	
	Conostylis serrulata				x		x	x	x	x	x	x	x
	Conostylis setigera				x		x	x	x		x	x	x
	Conostylis setigera subsp. *setigera*					x				x			
	Conostylis setosa				x		x	x	x		x	x	x
	Conostylis sp.						x		x	x	x	x	
	Haemodorum laxum											x	x
	Haemodorum spicatum												x
	Haemodorum sp.						x	x	x			x	x
	Tribonanthes longipetala				x								

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HAEMODORACEAE (continued)	Haemodoraceae sp.								x				
HALORAGACEAE	*Glischrocaryon angustifolium*											x	
	Glischrocaryon aureum								x		x	x	
	Gonocarpus benthamii								x				x
	Gonocarpus diffusus				x								
HEMEROCALLIDACEAE	*Agrostocrinum hirsutum*								x			x	
	Agrostocrinum scabrum											x	x
	Caesia micrantha											x	
	Chamaescilla corymbosa				x	x	x	x	x	x	x	x	x
	Chamaescilla corymbosa var. *corymbosa*				x	x							
	Dianella revoluta				x		x	x	x		x	x	x
	Johnsonia lupulina						x	x	x				x
	Stypandra glauca				x		x					x	
	Tricoryne elatior				x							x	x
	Tricoryne humilis				x							x	x
	Tricoryne sp.						x		x			x	
	?Hemerocallidaceae sp.						x						
HYPERICACEAE	* *Hypericum perforatum*				x							x	
HYPOXIDACEAE	*Pauridia gardneri*						x						
	Pauridia glabella											x	
	Pauridia occidentalis											x	
IRIDACEAE	* *Ixia fuscocitrina*				x								
	Orthrosanthus laxus												x
	Orthrosanthus laxus var. *laxus*				x								
	Patersonia babianoides				x							x	x
	Patersonia juncea				x				x				
	Patersonia occidentalis				x		x	x	x	x	x	x	x
	Patersonia pygmaea				x		x	x	x		x	x	x
	Patersonia rudis				x		x		x			x	
	Patersonia umbrosa				x								
	Patersonia sp.								x		x	x	
	* *Romulea rosea*											x	
	* *Sparaxis pillansii*				x								
JUNCACEAE	* *Juncus bufonius*												x
	* *Juncus microcephalus*				x								
	Juncus sp.						x					x	
JUNCAGINACEAE	*Cycnogeton huegelii*				x								
	Triglochin nana				x								
LAMIACEAE	*Hemiandra* sp. Jurien (B.J. Conn & M.E. Tozer BJC				x								
	Hemigenia incana				x			x				x	
	Hemigenia microphylla	P3			x							x	
	Hemigenia pritzelii				x		x	x	x	x	x	x	x
	Hemigenia wandooana				x								
	Hemigenia sp.						x						
	Lachnostachys verbascifolia var. *verbascifolia*				x								
	* *Lavandula stoechas* subsp. *stoechas*				x								

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LAMIACEAE (continued)	* *Stachys arvensis*				x								
	Lamiaceae sp.								x				
LAURACEAE	*Cassytha flava*				x								
	Cassytha glabella												x
	Cassytha racemosa				x								
	Cassytha racemosa forma *racemosa*				x								
	Cassytha sp.						x	x	x		x	x	
	Lauraceae sp.											x	
LENTIBULARIACEAE	*Utricularia inaequalis*				x								
	Utricularia petertaylorii				x								
	Utricularia violacea											x	
LINDSAEACEAE	*Lindsaea linearis*				x	x	x	x	x			x	
LOGANIACEAE	*Orianthera serpyllifolia*											x	x
	Orianthera serpyllifolia subsp. *angustifolia*				x							x	
	Phyllangium paradoxum					x							
LORANTHACEAE	*Nuytsia floribunda*						x	x					
MALVACEAE	*Commersonia corniculata*				x								
	Lasiopetalum cardiophyllum	P4			x							x	
	Lasiopetalum floribundum				x		x	x	x	x	x	x	x
	Lasiopetalum glabratum				x		x		x		x	x	x
	Lasiopetalum membranaceum	P3			x								
	Lasiopetalum pterocarpum	T	E	x									
	Lasiopetalum sp.								x				
	Thomasia macrocalyx				x				x				
	Thomasia paniculata				x		x	x	x	x	x	x	
	Thomasia pauciflora				x								x
	Thomasia sp.						x			x	x		
	Malvaceae sp.							x		x			
MENYANTHACEAE	*Liparophyllum latifolium*				x								
	Ornduffia parnassifolia											x	
MONTIACEAE	*Calandrinia* sp.							x					
MYRTACEAE	*Astartea pulchella*				x								
	Astartea scoparia				x	x	x	x	x	x	x	x	
	Babingtonia camphorosmae				x	x	x		x		x	x	
	Callistemon glaucus										x		
	Calothamnus graniticus subsp. *leptophyllus*	P4			x								
	Calothamnus planifolius					x							
	Calothamnus ?*planifolius* var. *pallidifolius*											x	
	Calothamnus quadrifidus subsp. *quadrifidus*				x								
	Calothamnus rupestris				x								
	Calothamnus sp.								x				
	Calytrix depressa				x								
	Calytrix flavescens											x	
	Calytrix fraseri											x	
	Calytrix leschenaultii				x				x		x		
	Calytrix sp.						x		x		x	x	
	Corymbia calophylla				x	x	x	x	x	x	x	x	x

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				EPBC	Naturemap	MCPL 2015a	MCPL 2015b	MCPL 2018	MCPL 2019b	MCPL 2019a	MCPL 2020	MCPL 2022, 2023	Permanent Forest
MYRTACEAE (continued)	*Darwinia citriodora*						x						
	Darwinia thymoides				x								
	Darwinia thymoides subsp. St Ronans (J.J. Alford & G.J.	P4			x								
	Eucalyptus accedens						x						
	Eucalyptus aspersa				x								
	* *Corymbia ?citriodora*											x	
	Eucalyptus drummondii				x		x						
	Eucalyptus laeliae				x								
	Eucalyptus latens				x								
	Eucalyptus marginata				x	x	x	x	x	x	x	x	x
	Eucalyptus marginata subsp. *marginata*				x								
	Eucalyptus megacarpa						x	x	x	x	x	x	
	* *Eucalyptus microcorys*						x					x	
	Eucalyptus patens				x	x	x	x	x	x	x	x	x
	Eucalyptus rudis					x			x		x	x	
	Eucalyptus wandoo											x	
	Eucalyptus wandoo subsp. *wandoo*				x								
	Eucalyptus sp.								x			x	
	Homalospermum firmum						x						
	Hypocalymma angustifolium				x	x	x	x	x	x	x	x	x
	Hypocalymma cordifolium				x		x	x	x	x	x	x	
	Hypocalymma robustum						x	x	x		x	x	x
	Hypocalymma sp.						x		x				
	Kunzea baxteri				x								
	Kunzea micrantha				x							x	
	Kunzea micrantha subsp. *micrantha*				x								
	Kunzea recurva				x							x	x
	Leptospermopsis erubescens				x				x			x	
	Leptospermopsis oligandra											x	
	Melaleuca ?brevifolia											x	
	Melaleuca incana											x	
	Melaleuca incana subsp. *incana*				x	x						x	
	Melaleuca lateritia						x					x	
	Melaleuca ?microphylla											x	
	Melaleuca parviceps				x		x						
	Melaleuca pauciflora											x	
	Melaleuca preissiana					x	x	x	x			x	
	Melaleuca rhaphiophylla											x	
	Melaleuca trichophylla								x		x		
	Melaleuca viminea											x	
	Melaleuca viminea subsp. *viminea*											x	
	Melaleuca sp.								x			x	
	Pericalymma ellipticum				x		x	x	x		x	x	
	Taxandria linearifolia				x	x	x	x	x	x	x	x	
	Thryptomene australis subsp. *australis*				x								
	Verticordia densiflora var. *densiflora*											x	
	Verticordia fimbrilepis subsp. *fimbrilepis*	T	E	x									
	Verticordia huegelii var. *decumbens*				x								
	Verticordia huegelii var. *huegelii*				x							x	
	Verticordia plumosa var. *plumosa*						x						
	Verticordia sp.											x	
	Myrtaceae sp.						x		x				
OLACACEAE	*Olax benthamiana*				x							x	
OPHIOGLOSSACEAE	*Ophioglossum gramineum*				x								

APPENDIX B: POTENTIAL VASCULAR PLANT SPECIES IN THE HOLYOAKE EAST AREA

Note: * denotes introduced species; T denotes threatened species; P1-P4 denotes priority species; SCC = State Conservation Code; FCC = Federal Conservation Code; CE = Critically Endangered, E = Endangered, V = Vulnerable.

Family	Species	SCC	FCC	Data source									
				EPBC	Naturemap	MCPL 2015a	MCPL 2015b	MCPL 2018	MCPL 2019b	MCPL 2019a	MCPL 2020	MCPL 2022, 2023	Permanent Forest
ORCHIDACEAE	*Caladenia caesarea* subsp. *caesarea*				x								
	Caladenia flava				x		x	x					x
	Caladenia flava subsp. *flava*				x	x							
	Caladenia flava subsp. *sylvestris*				x								
	Caladenia hirta subsp. *hirta*				x								
	Caladenia latifolia												x
	Caladenia macrostylis				x								x
	Caladenia nana subsp. *nana*				x								
	Caladenia reptans									x			x
	Caladenia serotina				x								
	Caladenia x *spectabilis*				x								
	Caladenia uliginosa subsp. *candicans*				x								
	Caladenia uliginosa subsp. *uliginosa*				x								
	Caladenia xantha				x								
	Caladenia sp.					x	x			x		x	x
	Cryptostylis ovata				x		x				x		
	Cryptostylis sp.											x	
	Cyanicula gemmata				x								
	Cyanicula sericea				x								x
	Cyrtostylis huegelii				x								
	Cyrtostylis robusta												x
	Diuris longifolia				x								x
	Diuris micrantha	T	V	x									
	Diuris porrifolia				x								
	Diuris purdiei	T	E	x									
	Diuris setacea				x								
	Diuris sp.											x	
	Drakaea livida												x
	Elythranthera brunonis				x								x
	Eriochilus dilatatus											x	x
	Leporella fimbriata												x
	Leporella sp.						x						
	Leptoceras menziesii				x								
	Lyperanthus serratus				x								x
	Microtis alba				x								
	Microtis alboviridis				x								
	Microtis atrata				x								
	Microtis brownii				x								
	Microtis media								x				x
	Microtis orbicularis				x								
	Microtis sp.						x						
	Paracaleana nigrita				x								x
	Prasophyllum brownii				x								x
	Prasophyllum cyphochilum				x								
	Prasophyllum hians				x								
	Prasophyllum sp.											x	
	Pterostylis barbata				x								
	Pterostylis concava				x								
	Pterostylis glebosa				x								
	Pterostylis pyramidalis				x		x						x
	Pterostylis recurva				x								x
	Pterostylis vittata				x							x	x
	Pterostylis sp.				x		x	x	x	x	x	x	
	Pterostylis sp. 2											x	
	Pyrorchis nigricans				x	x	x	x	x	x		x	x
	Thelymitra benthamiana				x								
	Thelymitra crinita				x							x	x

APPENDIX B: POTENTIAL VASCULAR PLANT SPECIES IN THE HOLYOAKE EAST AREA

Note: * denotes introduced species; T denotes threatened species; P1-P4 denotes priority species; SCC = State Conservation Code; FCC = Federal Conservation Code; CE = Critically Endangered, E = Endangered, V = Vulnerable.

Family	Species	SCC	FCC	Data source									
				EPBC	Naturemap	MCPL 2015a	MCPL 2015b	MCPL 2018	MCPL 2019b	MCPL 2019a	MCPL 2020	MCPL 2022, 2023	Permanent Forest
ORCHIDACEAE (continued)	*Thelymitra flexuosa*				x								
	Thelymitra graminea				x								
	Thelymitra macrophylla				x	x						x	x
	Thelymitra spiralis				x								
	Thelymitra stellata	T	E	x									
	Thelymitra sp.				x	x						x	x
	Orchidaceae sp.						x		x	x	x	x	
	Orchidaceae sp. 1											x	
	Orchidaceae sp. 1											x	
OROBANCHACEAE	* *Bellardia trixago*				x								
	* *Orobanche minor*						x	x	x			x	
OXALIDACEAE	* *Oxalis corniculata*												x
	Oxalis exilis				x								
	* *Oxalis glabra*				x								
	* *Oxalis pes-caprae*				x	x							
	* *Oxalis* sp.								x			x	
PAPAVERACEAE	* *Eschscholzia californica*				x								
PHYLLANTHACEAE	*Lysiandra calycina*				x	x	x	x	x	x	x	x	x
	Poranthera huegelii				x								
	Poranthera microphylla				x								x
	Poranthera sp.											x	
PHYTOLACCACEAE	* *Phytolacca octandra*								x				
PINACEAE	* *Pinus canariensis*				x								
	* *Pinus pinaster*						x				x	x	
	* *Pinus radiata*			x									
	* *Pinus* sp.						x						
PITTOSPORACEAE	*Billardiera floribunda*				x								x
	Billardiera fusiformis				x		x	x	x		x	x	x
	Billardiera heterophylla												x
	Billardiera variifolia				x				x			x	x
	Billardiera sp.					x	x		x			x	
	Cheiranthera parviflora				x							x	
	Marianthus bicolor										x	x	
	Marianthus drummondianus						x		x		x	x	
	Marianthus tenuis				x								
	Marianthus sp.											x	x
	Pittosporaceae sp.						x					x	
PLANTAGINACEAE	* *Plantago lanceolata*				x								
POACEAE	* *Aira caryophyllea*											x	x
	* *Aira cupaniana*				x								
	Amphipogon amphipogonoides								x	x		x	x
	Amphipogon laguroides								x				
	Amphipogon laguroides subsp. *laguroides*				x								
	Amphipogon sp.					x		x					
	Austrostipa elegantissima											x	
	Austrostipa macalpinei											x	
	Austrostipa sp.						x					x	
	* *Briza minor*				x							x	x

APPENDIX B: POTENTIAL VASCULAR PLANT SPECIES IN THE HOLYOAKE EAST AREA

Note: * denotes introduced species; T denotes threatened species; P1-P4 denotes priority species; SCC = State Conservation Code; FCC = Federal Conservation Code; CE = Critically Endangered, E = Endangered, V = Vulnerable.

Family	Species	SCC	FCC	Data source									
				EPBC	Naturemap	MCPL 2015a	MCPL 2015b	MCPL 2018	MCPL 2019b	MCPL 2019a	MCPL 2020	MCPL 2022, 2023	Permanent Forest
POACEAE (continued)	* *Cortaderia selloana* subsp. *selloana*				x								
	* *Ehrharta calycina*				x								
	Eriachne sp.										x		
	* *Lagurus ovatus*				x								
	* *Lolium* sp.				x								
	Neurachne alopecuroidea				x	x	x	x	x	x	x	x	x
	* *Pentameris airoides*											x	
	Poa porphyroclados											x	
	Poa sp.											x	
	Rytidosperma caespitosum				x	x	x	x	x	x	x	x	x
	Rytidosperma setaceum				x							x	
	Rytidosperma sp.						x					x	
	Tetrarrhena laevis				x	x	x	x	x	x	x	x	x
	* *Vulpia myuros*												x
	Poaceae sp.					x	x	x	x		x	x	
	Poaceae sp. 1											x	
	Poaceae sp. 2											x	
PODOCARPACEAE	*Podocarpus drouynianus*						x					x	
POLYGALACEAE	*Comesperma calymega*				x				x			x	x
	Comesperma virgatum						x		x			x	x
	Comesperma sp.						x					x	
PRIMULACEAE	* *Lysimachia arvensis*				x	x		x	x	x		x	x
PROTEACEAE	*Adenanthos barbiger*				x		x		x		x	x	x
	Adenanthos cygnorum											x	
	Adenanthos obovatus						x					x	
	Banksia bipinnatifida											x	
	Banksia dallanneyi												x
	Banksia dallanneyi subsp. *dallanneyi* var. *dallanneyi*				x	x	x	x	x	x	x	x	
	Banksia dallanneyi subsp. *sylvestris*						x					x	
	Banksia grandis				x	x	x	x	x	x	x	x	x
	Banksia littoralis				x	x	x	x	x		x	x	
	Banksia nivea												x
	Banksia nivea subsp. *nivea*											x	
	Banksia seminuda				x			x			x	x	
	Banksia sessilis				x		x		x	x	x	x	x
	Banksia sessilis var. *sessilis*				x								
	Banksia sphaerocarpa							x			x	x	
	Banksia sphaerocarpa var. *sphaerocarpa*				x								
	Banksia squarrosa subsp. *squarrosa*								x			x	
	Banksia undata var. *undata*				x								
	Banksia sp.									x	x		
	Conospermum acerosum				x								
	Conospermum capitatum							x				x	
	Conospermum capitatum subsp. *capitatum*											x	
	Conospermum capitatum subsp. *glabratum*						x						
	Conospermum flexuosum												x
	Conospermum sp.						x					x	
	Grevillea bipinnatifida								x			x	
	Grevillea centristigma				x								
	Grevillea dissectifolia	P3			x								
	Grevillea diversifolia								x				

APPENDIX B: POTENTIAL VASCULAR PLANT SPECIES IN THE HOLYOAKE EAST AREA

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Family	Species	SCC	FCC	Data source									
				EPBC	Naturemap	MCPL 2015a	MCPL 2015b	MCPL 2018	MCPL 2019b	MCPL 2019a	MCPL 2020	MCPL 2022, 2023	Permanent Forest
PROTEACEAE (continued)	*Grevillea diversifolia* subsp. *diversifolia*				x								
	Grevillea manglesii							x	x				
	Grevillea monticola				x							x	
	Grevillea pilulifera				x								
	Grevillea pulchella							x	x			x	
	Grevillea quercifolia				x		x						
	Grevillea wilsonii				x				x	x	x	x	
	Hakea amplexicaulis				x		x	x	x	x	x	x	x
	Hakea cyclocarpa								x			x	
	Hakea incrassata				x							x	
	Hakea lasianthoides				x						x		
	Hakea lissocarpha				x	x	x	x	x	x	x	x	x
	Hakea marginata											x	
	Hakea oldfieldii	P3			x								
	Hakea petiolaris subsp. *petiolaris*				x								
	Hakea prostrata					x					x	x	
	Hakea ruscifolia				x				x		x	x	x
	Hakea trifurcata											x	
	Hakea undulata				x							x	x
	Hakea varia				x			x			x	x	
	Isopogon dubius											x	
	Isopogon sphaerocephalus						x					x	
	Isopogon sp. Darling Range (F. Hort 1662)				x								
	Persoonia elliptica				x		x	x	x		x	x	x
	Persoonia longifolia				x	x	x	x	x	x	x	x	x
	Petrophile heterophylla				x								
	Petrophile striata				x							x	
	Stirlingia simplex				x							x	
	Synaphea cuneata				x								
	Synaphea gracillima				x								
	Synaphea petiolaris						x					x	
	Synaphea sp.											x	
	Xylomelum occidentale						x	x				x	
	Proteaceae sp.											x	
PTERIDACEAE	*Cheilanthes austrotenuifolia*							x					
	Cheilanthes sp.											x	
RANUNCULACEAE	*Clematis pubescens*				x	x	x	x	x	x	x	x	x
	Ranunculus colonorum				x							x	
	* *Ranunculus muricatus*				x								
	Ranunculus sp.											x	
RESTIONACEAE	*Chordifex gracilior*	P3			x								
	Desmocladus fasciculatus				x	x	x	x	x		x	x	x
	Desmocladus flexuosus				x	x	x	x	x		x	x	x
	Hypolaena exsulca					x	x	x	x		x	x	x
	Leptocarpus coangustatus				x							x	
	Leptocarpus decipiens				x							x	
	Leptocarpus roycei				x								
	Leptocarpus scariosus				x							x	
	Leptocarpus sp.											x	
	Lepyrodia curvescens	P2			x				x				
	Lepyrodia glauca											x	
	Loxocarya cinerea				x		x					x	x

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Family	Species	SCC	FCC	Data source									
				EPBC	Naturemap	MCPL 2015a	MCPL 2015b	MCPL 2018	MCPL 2019b	MCPL 2019a	MCPL 2020	MCPL 2022, 2023	Permanent Forest
RESTIONACEAE (continued)	*Loxocarya striata*				x		x						
	Sporadanthus rivularis						x						
	Taraxis grossa				x								
	Restionaceae sp.						x		x			x	
RHAMNACEAE	*Cryptandra arbutiflora* var. *arbutiflora*											x	
	Cryptandra sp.											x	
	Stenanthemum coronatum				x								
	Stenanthemum nanum				x							x	
	Trymalium ledifolium					x	x	x	x	x	x	x	x
	Trymalium ledifolium var. *rosmarinifolium*				x								
	Trymalium odoratissimum											x	
	Trymalium odoratissimum subsp. *odoratissimum*				x		x	x	x	x	x		x
	Trymalium odoratissimum subsp. *trifidum*							x					
ROSACEAE	*Acaena echinata*											x	
	* *Prunus persica* var. *nucipersica*				x								
	* *Rubus anglocandicans*				x								
	* *Rubus ulmifolius*			x					x				
RUBIACEAE	*Opercularia apiciflora*											x	x
	Opercularia echinocephala				x		x	x	x	x	x	x	x
	Opercularia hispidula				x			x				x	x
	Opercularia vaginata								x			x	x
	Opercularia sp.						x		x	x		x	
RUTACEAE	*Asterolasia pallida*				x		x	x	x				
	Boronia capitata subsp. *gracilis*	P3			x								
	Boronia crenulata				x		x		x			x	x
	Boronia crenulata subsp. *crenulata*										x		
	Boronia crenulata subsp. *crenulata* var. *crenulata*				x			x					
	Boronia crenulata subsp. *viminea*											x	
	Boronia fastigiata				x		x	x	x	x	x	x	x
	Boronia molloyae				x		x		x		x	x	
	Boronia spathulata				x								
	Boronia sp.						x					x	
	Cyanothamnus defoliatus				x								
	Philotheca spicata				x		x	x	x			x	x
SALICACEAE	* *Salix* spp. except *S. babylonica, S.* x *calodendron* & *S.* x *reichardtii*			x									
SALVINIACEAE	* *Salvinia* x*molesta*			x									
SANTALACEAE	*Leptomeria cunninghamii*				x		x			x		x	
SAPINDACEAE	*Dodonaea viscosa* subsp. *angustissima*				x								
	Dodonaea sp.								x				
SOLANACEAE	*Anthocercis gracilis*	T	V	x									
STYLIDIACEAE	*Levenhookia pusilla*					x	x					x	x
	Levenhookia stipitata											x	x
	Levenhookia sp.					x						x	
	Stylidium affine											x	
	Stylidium amoenum				x		x	x	x	x	x	x	x

APPENDIX B: POTENTIAL VASCULAR PLANT SPECIES IN THE HOLYOAKE EAST AREA

Note: * denotes introduced species; T denotes threatened species; P1-P4 denotes priority species; SCC = State Conservation Code; FCC = Federal Conservation Code; CE = Critically Endangered, E = Endangered, V = Vulnerable.

Family	Species	SCC	FCC	Data source									
				EPBC	Naturemap	MCPL 2015a	MCPL 2015b	MCPL 2018	MCPL 2019b	MCPL 2019a	MCPL 2020	MCPL 2022, 2023	Permanent Forest
STYLIDIACEAE (continued)	*Stylidium androsaceum*				x								
	Stylidium brunonianum				x	x			x				
	Stylidium bulbiferum									x			
	Stylidium calcaratum												x
	Stylidium carnosum											x	
	Stylidium ciliatum				x				x		x		
	Stylidium crassifolium												
	Stylidium dichotomum												
	Stylidium diuroides												x
	Stylidium hispidum				x					x		x	x
	Stylidium ireneae	P4			x								
	Stylidium junceum												
	Stylidium lateriticola				x							x	
	Stylidium lineatum				x		x						
	Stylidium longitubum	P4											
	Stylidium piliferum						x	x	x	x	x	x	x
	Stylidium pulchellum												
	Stylidium pycnostachyum				x								
	Stylidium recurvum				x								
	Stylidium repens						x		x		x		x
	Stylidium rhynchocarpum				x								
	Stylidium scariosum				x								
	Stylidium schoenoides												x
	Stylidium tenue subsp. *majusculum*				x								
	Stylidium thesioides												
	Stylidium utricularioides												
	Stylidium sp.						x	x	x	x	x	x	
THYMELAEACEAE	*Pimelea argentea*				x								
	Pimelea ciliata							x				x	
	Pimelea ciliata subsp. *ciliata*				x							x	
	Pimelea imbricata var. *piligera*				x								
	Pimelea lehmanniana subsp. *nervosa*				x								
	Pimelea rara	P4			x								
	Pimelea suaveolens						x	x	x		x	x	x
	Pimelea suaveolens subsp. *suaveolens*				x					x			
	Pimelea sylvestris				x							x	
	Pimelea sp.						x	x	x		x	x	
VERBENACEAE	* *Verbena incompta*				x								
VIOLACEAE	*Pigea calycina*												x
	Pigea debilissima				x								x
	Pigea floribunda				x							x	
XANTHORRHOEACEAE	*Xanthorrhoea gracilis*				x	x	x	x	x	x	x	x	x
	Xanthorrhoea preissii				x	x	x	x	x	x	x	x	x
	Xanthorrhoea sp.				x				x			x	
ZAMIACEAE	*Macrozamia fraseri*				x								
	Macrozamia riedlei				x	x	x	x	x	x	x	x	x

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE HOLYOAKE EAST SURVEY AREA

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. A range of species were included in the 20km radius desktop search and depending on location (based collections in State Herbarium - Florabase) and also site conditions were ranked as likelihood of Low, Moderate or High. SVT Code – site-vegetation code based on Havel (1975a and 1975b).

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: 29	Moderate DBCA records in close proximity of the area. Occurs on similar soil profile as proposed site.
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: 7	Low Has not been recorded by DBCA or by MCPL previously within the survey area
Diuris purdiei	Orchidaceae	T	Endangered	Habit: Tuberous, perennial, herb, 0.15-0.35 m high. Flower colour: yellow Flowering period (indicated in green): 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: 24	Low Has not been recorded by DBCA or by MCPL previously within the survey area
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	Low Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE HOLYOAKE EAST SURVEY AREA

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. A range of species were included in the 20km radius desktop search and depending on location (based collections in State Herbarium - Florabase) and also site conditions were ranked as likelihood of Low, Moderate or High. SVT Code – site-vegetation code based on Havel (1975a and 1975b).

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Thelymitra dedmaniarum	Orchidaceae	T	Endangered	Habit: Tuberous, perennial, herb, to 0.8 m high. Flower colour: yellow Flowering period (indicated in green): **J F** M A M J **J** A S O **N D** Soils: Granite IBRA Distribution: JAF Florabase records: 4	Low Has not been recorded by DBCA or by MCPL previously within the survey area
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	Low Has not been recorded by DBCA or by MCPL previously within the survey area
Verticordia fimbrilepis subsp. *fimbrilepis*	Myrtaceae	T	Endangered	Habit: Shrub, 0.3-0.7 m high. Flower colour: pink-white Flowering period (indicated in green): **J** F M A M J J A S **O N D** Soils: Gravelly or clayey soils. Flats, road verges. IBRA Distribution: AVW, JAF Florabase records: 39	Low Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area
Bossiaea modesta	Fabaceae	P2	-	Habit: Slender, trailing & twining shrub. Flower colour: yellow & red Flowering period (indicated in green): J F M A M J J A S **O N D** Soils: Soils derived from granite. Damp areas close to stream. IBRA Distribution: JAF, SWA Florabase records: 22	Moderate Occurs on similar soils and to the west of the survey area

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE HOLYOAKE EAST SURVEY AREA

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. A range of species were included in the 20km radius desktop search and depending on location (based collections in State Herbarium - Florabase) and also site conditions were ranked as likelihood of Low, Moderate or High. SVT Code – site-vegetation code based on Havel (1975a and 1975b).

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Lepyrodia curvescens	Restionaceae	P2	-	Habit: Dioecious, shortly creeping, tufted rhizomatous, herb, 0.24-0.4 m high, rhizomes on surface or to 1 cm deep. Flower colour: - Flowering period (indicated in green): J F M A M J J A **S O N** D Soils: Sand, laterite. Seasonally inundated swampland. IBRA Distribution: GES, JAF, SWA Florabase records: 20	Low Previously recorded by MCPL(209) within the Pinjarra farmlands. Associated with swamplands
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 Not previously recorded and doesn't occur within the same soil type
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	Moderate Occurs on granitic soils, although has been known to occur close to the Dwellingup townsite.

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE HOLYOAKE EAST SURVEY AREA

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. A range of species were included in the 20km radius desktop search and depending on location (based collections in State Herbarium - Florabase) and also site conditions were ranked as likelihood of Low, Moderate or High. SVT Code – site-vegetation code based on Havel (1975a and 1975b).

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
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: 22	Moderate Occurs on similar soil types as survey area
Boronia capitata subsp. *gracilis*	Rutaceae	P3	-	Habit: Slender shrub, 0.3-0.6(-3) m high, branches pilose. Flower colour: pink Flowering period (indicated in green): J F M A M **J J A S O N** D Soils: White/grey or black sand. Winter-wet swamps, hillslopes. IBRA Distribution: JAF, SWA, WAR Florabase records: 28	Moderate Has not been previously recorded within the survey site. This species does occur on the soil types/ landforms within the survey area.
Chordifex gracilior	Restionaceae	P3	-	Habit: Rhizomatous, erect perennial, herb, 0.3-0.5 m high. Flower colour: brown Flowering period (indicated in green): J F M A M J J A **S O N D** Soils: Peaty sand. Swamps. IBRA Distribution: JAF, SWA, WAR Florabase records: 31	Moderate Has been previously to the east of the survey area.
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: 39	Moderate Recorded previously by MCPL (2015)

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE HOLYOAKE EAST SURVEY AREA

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. A range of species were included in the 20km radius desktop search and depending on location (based collections in State Herbarium - Florabase) and also site conditions were ranked as likelihood of Low, Moderate or High. SVT Code – site-vegetation code based on Havel (1975a and 1975b).

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Grevillea manglesii subsp. *dissectifolia*	Proteaceae	P3	-	Habit: Spreading, virgate shrub, 1.5-3 (-5) m high, up to 33 m wide. Flower colour: white & red & brown Flowering period (indicated in green): J F M A M **J** J A **S O N** D Soils: Gravelly loam, moist. Roadsides. IBRA Distribution: JAF Florabase records: 27	Low Recorded in Dwellingup townsite.
Hakea oldfieldii	Proteaceae	P3	-	Habit: Open, straggling shrub, up to 2.5 m high. Flower colour: white-cream/yellow Flowering period (indicated in green): J F M A M J J **A S O** N D Soils: Red clay or sand over laterite. Seasonally wet flats. IBRA Distribution: AVW, ESP, JAF, MAL, SWA Florabase records: 58	High Recorded previously near the survey area in brown gravelly loam.
Hemigenia microphylla	Lamiaceae	P3	-	Habit: Erect shrub to 1 m high. Flower colour: mauve-purple-lilac Flowering period (indicated in green): **J** F M A M J J A S **O N D** Soils: Clay, sandy clay, grey peaty clay, granite. Winter wet flats, lower slopes. IBRA Distribution: JAF, SWA, WAR Florabase records: 25	High Associated with soil types/ landforms; has been recorded near the survey site.
Lasiopetalum membranaceum	Malvaceae	P3	-	Habit: Multi-stemmed shrub, 0.2-1 m high. Flower colour: pink-blue-purple Flowering period (indicated in green): J F M A M J J A **S O N D** Soils: Sand over limestone IBRA Distribution: JAF, SWA, WAR Florabase records: 35	Low Associated with soil types/ landforms not typically found within the survey site, although Previous DBCA records found in Dwellingup

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE HOLYOAKE EAST SURVEY AREA

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. A range of species were included in the 20km radius desktop search and depending on location (based collections in State Herbarium - Florabase) and also site conditions were ranked as likelihood of Low, Moderate or High. SVT Code – site-vegetation code based on Havel (1975a and 1975b).

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Tetratheca ?pilifera	Elaeocarpaceae	P3	-	Habit: Spreading shrub, 0.1-0.3 m high. Flower colour: purple Flowering period (indicated in green): J F M A M J J **A S O** N D Soils: Gravelly soils.7 IBRA Distribution: JAF, SWA Florabase records: 34	Low Typically found North of survey site in similar soil as the survey area, however has been previously recorded my MCPL (2019b)
Tetratheca similis	Elaeocarpaceae	P3	-	Habit: Spreading shrub, to 0.3 m high. Flower colour: pink Flowering period (indicated in green): J F M A M J J **A S** O N D Soils: Sandy clay with lateritic boulders. IBRA Distribution: AVW, JAF Florabase records: 20	Low Typically found North east of survey site.
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 previously in similar soil type/ landforms as the survey area.
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	Moderate Recorded previously by DBCA at Dwellingup townsite in similar soil type/ landforms as the survey area.

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE HOLYOAKE EAST SURVEY AREA

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. A range of species were included in the 20km radius desktop search and depending on location (based collections in State Herbarium - Florabase) and also site conditions were ranked as likelihood of Low, Moderate or High. SVT Code – site-vegetation code based on Havel (1975a and 1975b).

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Chorizema ulotropis	Fabaceae	P4	-	Habit: Sprawling, open, semi-prostrate shrub, to 0.45 m high. Flower colour: orange-yellow Flowering period (indicated in green): J F M A M J **J** **A** **S** O N D Soils: Moist to dry soils, white sand with gravel, laterite, granite. Outcrops, winter damp to dry areas, flats. IBRA Distribution: ESP, JAF, MAL Florabase records: 24	Low Recorded previously by DBCA at Dwellingup townsite.
Darwinia thymoides subsp. St Ronans (J.J. Alford & G.J. Keighery 64)	Myrtaceae	P4	-	Habit: Low spreading shrub. Flower colour: orange-red Flowering period (indicated in green): J F M A M J J A S **O** **N** D Soils: Yellow brown sand, clay, gravel, loamy clay over granite, Sand over laterite. Hilltops, slopes, valleys. IBRA Distribution: AVW, JAF Florabase records: 22	Moderate Previously recorded by DBCA east of the survey area. Occurs in similar soil type/ landforms as the survey area.
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: 18	Moderate Has been recorded near the survey area.

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE HOLYOAKE EAST SURVEY AREA

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Lasiopetalum cardiophyllum	Malvaceae	P4	-	Habit: Erect, multi-stemmed shrub, 0.2-0.5 m high. Flower colour: pink Flowering period (indicated in green): **J F M A M J J A S O N D** Soils: Lateritic gravelly soils, sandy clay. Flats, hillslopes. IBRA Distribution: AVW, JAF Florabase records: 34	High Has been recorded within and near the survey area.
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	Low Has not been recorded by DBCA or by MCPL previously within the survey area, has been recorded south of Dwellingup, close to Linto Road.
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	Low DBCA record close to Nanga Road south of survey area, on a slope on yellow/red clay/gravel.
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: 44	High Previously recorded by MCPL over multiple years. Has been recorded within survey area.

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE HOLYOAKE EAST SURVEY AREA

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
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: 25	Moderate Has been recorded by DBCA or by MCPL previously near the survey area.
Stylidium longitubum	Stylidiaceae	P4	-	Habit: Erect annual (ephemeral), herb, 0.05-0.12 m high. Flower colour: pink Flowering period (indicated in green): J F M A M J J A S O N D Soils: Sandy clay, clay. Seasonal wetlands. IBRA Distribution: GES, JAF, SWA Florabase records: 46	Low Has not been recorded by DBCA or by MCPL previously within the survey area.

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE HOLYOAKE EAST SURVEY AREA

Note: WONS = Weeds of National Significance (Department of Agriculture, Fisheries and Forestry 2023e); WAOL = Western Australian Organism List (Department of Primary Industries and Regional Development 2023). IBRA Distribution: AVW – Avon Wheatbelt; CAR – Carnarvon; CEK – Central Kimberley; CEN – Central Ranges; COO – Coolgardie; DAL – Dampierland; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; GIB – Gibson Desert; GSD – Great Sandy Desert; GVD – Great Victoria Desert; HAM – Hampton; JAF – Jarrah Forest; LSD – Little Sandy Desert; MAL – Mallee; MUR – Murchison; NOK – Northern Kimberley; NUL – Nullarbor; PIL – Pilbara; SWA – Swan Coastal Plain; TAN – Tanami; VIB – Victoria Bonaparte; WAR – Warren; YAL – Yalgoo. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Acacia decurrens*	No	Permitted - s11	-	-	-	Habit: Tree, 2-10 metres high. Flower colour: yellow Flowering period (indicated in green): J F M A M **J J A S** O N D Soils: Roadsides, creeklines & wasteland. IBRA Distribution: AVW, JAF, SWA, WAR Florabase records: 33	Low
**Acacia longifolia* subsp. *longifolia*	No	Permitted - s11	-	-	-	Habit: Rounded shrub or tree, 1-10 m high, phyllodes flat, 50-200 mm long; spikes simple; pods 4-10 mm wide. Flower colour: yellow Flowering period (indicated in green): J F M A M **J J A S** O N D Soils: Sand & gravelly lateritic soils. IBRA Distribution: JAF, SWA, WAR Florabase records: 25	Low
**Acacia podalyriifolia*	No	Permitted - s11	-	-	-	Habit: Spreading tree, to 7 m high, glaucous, densely hairy phyllodes and flat, wide pods. Flower colour: yellow Flowering period (indicated in green): J F M A **M J J A** S O N D Soils: Grey sand, lateritic loam. IBRA Distribution: GES, JAF, SWA, WAR Florabase records: 29	Low
**Acacia pycnantha*	No	Permitted - s11	-	-	-	Habit: Shrub or tree, 2-8 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J **J A S O** N D Soils: Brown, sandy loam. IBRA Distribution: AWV, COO, ESP, JAF, MAL, SWA, WAR Florabase records: 55	Low

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE HOLYOAKE EAST SURVEY AREA

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Aira caryophyllea*	No	Permitted - s11	-	-	-	Habit: Annual, grass-like or herb, 0.07-0.4 m high. Flower colour: green-purple Flowering period (indicated in green): J F M A M J J A S **O N** D Soils: Clay, grey sand, peat, gravel. Winter-wet claypans. IBRA Distribution: AWV, COO, ESP, JAF, SWA, WAR Florabase records: 23	High
**Aira cupaniana*	No	Permitted - s11	-	-	-	Habit: Annual, grass-like or herb, 0.1-0.4 m high. Flower colour: green Flowering period (indicated in green): J F M A M J J A **S O N** D Soils: Sandy clay, sand, loam. IBRA Distribution: AWV, COO, ESP, GES, JAF, MAL, SWA, WAR Florabase records: 191	Low
**Allium triquetrum*	No	Permitted - s11	-	-	-	Habit: Bulbaceous, perennial, herb, to 0.3 m high Flower colour: white Flowering period (indicated in green): J F M A M J J **A S O** N D Soils: Watercourse. Brown loam / clay. Slope. Grey sand. IBRA Distribution: AWV, JAF, SWA, WAR Florabase records: 34	Low
**Arctotheca calendula*	No	Permitted - s11	-	-	-	Habit: Decumbent or ascending annual, herb, 0.03-0.3 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A S O N** D Soils: Roadsides, waste places. IBRA Distribution: AVW, CAR, COO, ESP, GES, HAM, JAF, MAL, MUR, PIL, SWA, WAR, YAL Florabase records: 236	Moderate

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Asparagus asparagoides*	Yes	Declared Pest - s22(2)	-	Exempt	No Control Category, Whole of State	Habit: Rhizomatous and tuberous, perennial, herb and climber, 1-5 m high. Flower colour: white Flowering period (indicated in green): J F M A M J J **A** **S** O N D Soils: Sand, loam, clay, granite. IBRA Distribution: AVW, COO, ESP, GES, JAF, MAL, SWA, WAR Florabase records: 78	Low
**Bellardia trixago*	No	Permitted - s11	-	-	-	Habit: Erect annual herb Flower colour: white/ cream/ pale pink Flowering period (indicated in green): J F **M** A M J J A **S** **O** **N** **D** Soils: Flat sandplain of deep grey sandy soil. Dried clay flat. Brown clay loam. gravelly brown-white clay-clayey sand over ironstone. IBRA Distribution: AVW, ESP, GES, JAF, SWA, WAR Florabase records: 110	Low
**Briza minor*	No	Permitted - s11	-	-	-	Habit: Tufted, glabrous annual, grass-like or herb, 0.15-0.5 m high. Flower colour: green Flowering period (indicated in green): J F M A M J J A **S** **O** N D Soils: Loam, sand, clay, laterite IBRA Distribution: AVW, COO, ESP, GES, JAF, MAL, MUR, SWA, WAR, YAL Florabase records: 178	High
**Callitris endlicheri*	No	Permitted - s11	-	-	-	Habit: Slender erect tree Soils: Flat. Lateritic sandy clay. IBRA Distribution: JAF Florabase records: 1	Low

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE HOLYOAKE EAST SURVEY AREA

Note: WONS = Weeds of National Significance (Department of Agriculture, Fisheries and Forestry 2023e); WAOL = Western Australian Organism List (Department of Primary Industries and Regional Development 2023). IBRA Distribution: AVW – Avon Wheatbelt; CAR – Carnarvon; CEK – Central Kimberley; CEN – Central Ranges; COO – Coolgardie; DAL – Dampierland; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; GIB – Gibson Desert; GSD – Great Sandy Desert; GVD – Great Victoria Desert; HAM – Hampton; JAF – Jarrah Forest; LSD – Little Sandy Desert; MAL – Mallee; MUR – Murchison; NOK – Northern Kimberley; NUL – Nullarbor; PIL – Pilbara; SWA – Swan Coastal Plain; TAN – Tanami; VIB – Victoria Bonaparte; WAR – Warren; YAL – Yalgoo. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
** Centaurium erythraea*	No	Permitted - s11	-	-	-	Habit: Biennial or annual, herb, 0.05-0.5 m high. Flower colour: pink/pink-red Flowering period (indicated in green): J F M A M J J A S O N D Soils: Damp habitats. IBRA Distribution: AVW, CER, COO, ESP, GAS, GES, GVD, HAM, JAF, MAL, OVP, SWA, WAR Florabase records: 111	Moderate
** Centaurium tenuiflorum*	No	Permitted - s11	-	-	-	Habit: Annual, herb, 0.15-0.53 m high. Flower colour: pink Flowering period (indicated in green): J F M A M J J A S O N D Soils: Drainage lines, swamps. IBRA Distribution: AVW, COO, ESP, GES, JAF, MAL, SWA, WAR Florabase records: 83	Moderate
**Chenopodium album*	No	Permitted - s11	-	-	-	Habit: Erect annual, herb, 0.2-1(-1.7) m high. Flower colour: green Flowering period (indicated in green): J F M A M J J A S O N D Soils: Sand, loam, sandy clay. Weed in agricultural areas. IBRA Distribution: AVW, COO, ESP, JAF, MAL, SWA, WAR. YAL Florabase records: 51	Low
**Chenopodium murale*	No	Permitted - s11	-	-	-	Habit: Erect, much-branched annual, herb, 0.2-1 m high. Flower colour: green Flowering period (indicated in green): J F M A M J J A S O N D Soils: Agricultural weed, cultivated & disturbed areas, coastal sites. IBRA Distribution: AVW, CAR, COO, ESP, GAS, , GES. HAM, JAF, MAL, MUR, NUL, PIL, SWA, WAR, YAL Florabase records: 121	Low

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
* *Chrysanthemoides monilifera*	No	Declared Pest, Prohibited - s12	C1 Exclusion	Prohibited	Whole of State	Habit: Shrub, 0.8-3 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O N D Soils: Swampy loam, lateritic sandy clay. Coastal areas, roadsides, waste areas. IBRA Distribution: JAF Florabase records: 47	Low
* *Chrysanthemoides monilifera* subsp. *monilifera*	Yes	Declared Pest, Prohibited - s12	C2 Eradication	Prohibited	Whole of State	Habit: Erect shrub, 0.8-3m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O N D Soils: Red-brown loam, limestone rubble. Sandplains, coastal areas, roadsides & waste areas. IBRA Distribution: AVW, GES, JAF, SWA Florabase records: 47	Low
**Cortaderia selloana* subsp. *selloana*	No	Permitted - s11	-	-	-	Habit: Perennial erect grass Flower colour: cream-grey Soils: Hillside. Damp grey sand. Brown wet loam clay. IBRA Distribution: AVW, ESP, JAF,MAL, SWA, WAR Florabase records: 117	Low
**Corymbia citriodora*	No	Permitted - s11	-	-	-	Habit: Slender tall tree, bark smooth, pale orange-grey. Leaves with distinct lemon scent. Flower colour: white Flowering period (indicated in green): J F M A M J J A S O N D Soils: Brown loam. IBRA Distribution: JAF, SWA Florabase records: 3	Moderate

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE HOLYOAKE EAST SURVEY AREA

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Cyperus congestus*	No	Permitted - s11	-	-	-	Habit: Tufted, colonial perennial, grass-like or herb (sedge), 1 m high. Flower colour: brown Flowering period (indicated in green): **J F M** A M J **J** A S **O N** D Soils: Grey sandy clay, sand. Swamps. IBRA Distribution: AVW, ESP, GES, JAF, SWA, WAR Florabase records: 110	Low
**Cyperus tenellus*	No	Permitted - s11	-	-	-	Habit: Tufted annual, grass-like or herb (sedge), 0.02-0.12 m high, stems filiform, 0.1-0.2mm diameter, with a solitary spikelet or 2-4 spikelet's in a pseudolateral cluster. Flower colour: green-brown Flowering period (indicated in green): **J** F M A M J J **A S O N** D Soils: White or grey clayey sand, clay, brown loam, granite. Margins of swamps, rockpools on granite and other damp habitats. IBRA Distribution: AVW, COO, ESP, GES, JAF,MAL, SWA, WAR, YAL Florabase records: 122	Moderate
**Dittrichia graveolens*	No	Permitted - s11	-	-	-	Habit: Erect, bushy, viscid, aromatic annual, herb, 0.1-0.5(-1) m high. Flower colour: yellow/yellow-white Flowering period (indicated in green): **J F M A M J J A S O N** D Soils: Variety of soils; weed of waste grounds; along rivers, roadsides. IBRA Distribution: AVW, COO, ESP, GES, HAM, JAF, MAL, MUR, SWA, WAR Florabase records: 93	Moderate

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Ehrharta calycina*	No	Permitted - s11	-	-	-	Habit: Caespitose perennial, grass-like or herb, 0.3-0.7 m high. Flower colour: green/purple/red Flowering period (indicated in green): J F **M A** M J J **A S** O N D Soils: White, grey or yellow sand, loam. IBRA Distribution: AVW, CAR, ESP, GES, HAM, JAF, MAL, MUR, SWA, WAR Florabase records: 96	Low
**Erigeron sumatrensis*	No		-	-	-	Habit: Annual herb to about 2 m high. Flower colour: cream Flowering period (indicated in green): **J F M A M J J A** S O N **D** Soils: Weed of pasture, road sides, cultivation, and wasteland. Widespread. IBRA Distribution: AVW, COO, ESP, GES, JAF, MAL, SWA, WAR Florabase records: 110	Moderate
**Eschscholzia californica*	No	Permitted - s11	-	-	-	Habit: Spreading annual or biennial, herb, to 0.3 m high. Flower colour: yellow/orange Flowering period (indicated in green): J F M A M J J A **S** O N D Soils: Sand, loam. IBRA Distribution: JAF, WAR Florabase records: 4	Low
**Eucalyptus microcorys*	No	Permitted - s11	-	-	-	Habit: Tree, 5-12 m high, bark rough grey, smooth on upper branches. Flower colour: white Flowering period (indicated in green): **J** F M A M J J **A S O N** D Soils: Brown loam over laterite, clay. Disturbed woodland, creekline. IBRA Distribution: JAF, WAR Florabase records: 8	Moderate

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Gamochaeta calviceps*	No	Permitted - s11	-	-	-	Habit: Annual, herb, to 0.15 m high Flower colour: yellow-brown Flowering period (indicated in green): J F M A M J J A S O **N** D Soils: Grey sandy clay, red-brown sandy loam, peaty sand over granite. Winter-wet depressions, river flats, road verges. IBRA Distribution: AVW, ESP, GES, JAF, SWA, WAR Florabase records: 20	Moderate
**Genista* sp. × *Genista monspessulana*	Yes	Permitted - s11	-	-	-	Habit: Erect shrub, 1-5 m high, leaves trifoliolate, petiolate, standard more or less glabrous. Flower colour: yellow Flowering period (indicated in green): **J** F M A M J J **A** S O **N** D Soils: Loam, lateritic sand, black peaty sand. Edging rivers and roadsides. IBRA Distribution: AVW, ESP, GES, JAF, SWA, WAR Florabase records: 38	Low
** Gomphocarpus fruticosus*	No	Declared Pest - s22(2)	C3 Management	-	Shire of Boddington, Shire of Murray, Shire of Waroona	Habit: Erect perennial, herb or shrub, 0.5-1.5 m high. Flower colour: white/cream Flowering period (indicated in green): J **F** **M** **A** **M** **J** **J** A S O N D Soils: Disturbed sites. IBRA Distribution: AVW, ESP, JAF, MAL, NUL, SWA Florabase records: 44	Low

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Hypericum perforatum*	No	Permitted - s11	-	-	-	Habit: Erect perennial, herb, 0.3-0.9 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O N D Soils: Roadsides, pastures. IBRA Distribution: AVW, CAR, JAF, WAR Florabase records: 32	Moderate
**Hypochaeris glabra*	No	Permitted - s11	-	-	-	Habit: Rosetted annual or perennial, herb, 0.08-0.5 m high, leaves smooth; flower heads up to 1.5 cm across. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O N D Soils: Common weed of lawns, horticultural areas, roadsides & bushland. IBRA Distribution: AVW, CAR, COO, ESP, GES, JAF, LSD, MAL, MUR, SWA, WAR, YAL Florabase records: 353	High
**Hypochaeris radicata*	No	Permitted - s11	-	-	-	Habit: Rosetted annual, herb, 0.08-0.5 m high, leaves rough, bristly; flower heads up to 3 cm across Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O N D Soils: Common weed of lawns, horticultural areas, roadsides & bushland. IBRA Distribution: AVW,ESP, JAF, MAL, SWA, WAR Florabase records: 73	Low

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Ixia fuscocitrina*	No	Permitted - s11	-	-	-	Habit: Cormous, perennial, herb, to 1 m high, perianth tube 0.5-2 cm long. Flower colour: yellow-orange-purple Flowering period (indicated in green): J F M A M J J **A S O** N D Soils: Lateritic loam, grey sand, sandy clay, granite. Road verges. IBRA Distribution: AVW, JAF, SWA, WAR Florabase records: 74	Low
**Juncus bufonius*	No	Permitted - s11	-	-	-	Habit: Annual, grass-like or herb, 0.04-0.3 m high. Flowering period (indicated in green): **J** F M A M J J A **S O N D** Soils: Granite. Swamps, seepage areas, creeks. IBRA Distribution: AVW, COO, ESP, GES, GVD, JAF, MAL, MUR, NUL, SWA, WAR, YAL Florabase records: 196	Low
**Juncus microcephalus*	No	Permitted - s1	-	-	-	Habit: Robust rhizomatous, colonial perennial, herb, 0.5-2 m high. Flowering period (indicated in green): **J F** M A M J J A S O **N D** Soils: Clay, sand, often wet. Drains, springs. IBRA Distribution: ESP, JAF, SWA, WAR Florabase records: 87	Low

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Lactuca serriola* forma *serriola*	No	Permitted - s11	-	-	-	Habit: Erect, climbing herb (with spiny leaves), to 2 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O N D Soils: White to brown sand, red loam, brown gravelly loam, black-brown alluvium. Dunes, flats, river banks, valleys, drainage lines. IBRA Distribution: AVW, CAR, COO, JAF, MUR, PIL, SWA Florabase records: 48	Low
**Lagurus ovatus*	No	Permitted - s11	-	-	-	Habit: Annual, grass-like or herb, 0.1-0.3 m high. White, grey, brown or black sand. Swamp edges, roadsides, dunes. Flower colour: white/other Flowering period (indicated in green): J F M A M J J A S O N D Soils: White, grey, brown or black sand. Swamp edges, roadsides, dunes. IBRA Distribution: ESP, HAM, JAF, SWA, WAR Florabase records: 77	Low
**Lathyrus latifolius*	No	Permitted - s11	-	-	-	Habit: Climber. Flower colour: purple/pink/white Flowering period (indicated in green): J F M A M J J A S O N D Soils: Sandy & lateritic soils. Roadsides, damp depressions. IBRA Distribution: ESP, JAF, SWA, WAR Florabase records: 7	Low

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Lavandula stoechas* subsp. *stoechas*	No	Permitted - s11	-	-	-	Habit: Aromatic shrub, 0.3-1 m high. Flower colour: purple Flowering period (indicated in green): J F M A M J **J A S O N D** Soils: Sand, loam, clay, gravel. Often on road verges. IBRA Distribution: AVW, JAF, SWA, WAR Florabase records: 42	Low
**Lotus uliginosus*	No	Permitted - s11	-	-	-	Habit: Erect or ascending perennial, herb, 0.1-0.5 m high. Flower colour: yellow Flowering period (indicated in green): **J F M** A M J J A S O **N D** Soils: Grey sandy loam, mud, black sand, clay loam. Swamps, creeklines, disturbed & cultivated areas, road verges. IBRA Distribution: AVW, JAF, SWA, WAR Florabase records: 46	Low
**Lysimachia arvensis*	No	Permitted - s11	-	-	-	Habit: A annual herbaceous plant with low-growing stems usually only 5-30 cm long, but occasionally reaching up to 50 cm in length. Flower colour: purple/blue Flowering period (indicated in green): J F M A M J **J A S O N D** Soils: A common weed of pastures, crops, parks, lawns, gardens, roadsides, disturbed sites, waste areas, swamp margins, open woodlands, shrublands, grasslands, rocky outcrop vegetation and coastal environments. IBRA Distribution: AVW, CAR, COO, ESP, GAS, GES, HAM, JAF, MAL, MUR, NUL, PIL, SWA, WAR, YAL Florabase records: 364	High

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Narcissus papyraceus*	No	Permitted - s11	-	-	-	Habit: Bulbaceous, perennial, herb, to 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: Peaty or calcareous sand, loam, winter-wet. IBRA Distribution: GES, JAF, SWA Florabase records: 7	Low
**Orobanche minor*	No	Permitted - s11	-	-	-	Habit: Erect, parasitic herb, 0.1-0.45 m high. Flower colour: white-cream-purple/brown Flowering period (indicated in green): J F M A M J J A **S O N D** Soils: Shallow soils over granite, deep sand, calcareous soils, clay. Coastal dunes & cliffs, sandplains, roadsides, granite outcrops. IBRA Distribution: AVW, CAR, COO, ESP, GES, JAF, SWA, WAR Florabase records: 115	High
**Oxalis corniculata*	No	Permitted - s11	-	-	-	Habit: Creeping annual, herb, 0.02-0.2 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A S O N** D Soils: A weed of lawns & gardens. IBRA Distribution: AVW, CEK, COO, DAL, ESP, JAF, MAL, PIL, SWA, VIB, WAR Florabase records: 40	Low
** Oxalis glabra*	No	Permitted - s11	-	-	-	Habit: Slender bulbaceous, perennial, herb, 0.05-0.2 m high. Flower colour: pink-purple/red & yellow Flowering period (indicated in green): J F M A **M J J A** S O N D Soils: Sand, clay, sandy clay, lateritic soils. Disturbed areas. IBRA Distribution: AVW, GES, JAF, SWA, WAR Florabase records: 60	Low

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Oxalis pes-caprae*	No	Permitted - s11	-	-	-	Habit: Bulbaceous and rhizomatous, perennial, herb, 0.1-0.3 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M **J J A S O** N D Soils: A common weed. IBRA Distribution: AVW, COO, ESP, GES, JAF, MAL, SWA, WAR, YAL Florabase records: 80	Low
**Pentameris airoides*	No	Permitted - s11	-	-	-	Habit: Annual or perennial. Culms 6–35 cm tall, 2–4 noded. Lateral branches simple. Leaves mostly basal. Ligule a fringe of hairs. Leaf-blades 3–6 cm long, 1–3 mm wide. Leaf-blade surface indumented. Flower colour: green Flowering period (indicated in green): J F M A M J J A S **O N** D Soils: Sand, loam, clay, gravel. Often on road verges. IBRA Distribution: AVW, CAR, COO, ESP, GES, JAF, MAL, MUR, SWA, YAL Florabase records: 236	Moderate
**Petrorhagia dubia*	No	Permitted - s11	-	-	-	Habit: Erect annual, herb, 0.1-0.7 m high. Flower colour: pink/pink-purple/white Flowering period (indicated in green): J F **M** A M J **J A S O N D** Soils: Sand, loam, clay. IBRA Distribution: AVW, COO, ESP, GES, JAF, MAL, MUR, SWA, WAR, YAL Florabase records: 150	Moderate

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE HOLYOAKE EAST SURVEY AREA

Note: WONS = Weeds of National Significance (Department of Agriculture, Fisheries and Forestry 2023e); WAOL = Western Australian Organism List (Department of Primary Industries and Regional Development 2023). IBRA Distribution: AVW – Avon Wheatbelt; CAR – Carnarvon; CEK – Central Kimberley; CEN – Central Ranges; COO – Coolgardie; DAL – Dampierland; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; GIB – Gibson Desert; GSD – Great Sandy Desert; GVD – Great Victoria Desert; HAM – Hampton; JAF – Jarrah Forest; LSD – Little Sandy Desert; MAL – Mallee; MUR – Murchison; NOK – Northern Kimberley; NUL – Nullarbor; PIL – Pilbara; SWA – Swan Coastal Plain; TAN – Tanami; VIB – Victoria Bonaparte; WAR – Warren; YAL – Yalgoo. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Phytolacca octandra*	No	Permitted - s11	-	-	-	Habit: Spreading, erect perennial, herb or shrub, 0.4-1.7 m high. Flower colour: white-pink-red Flowering period (indicated in green): J F M A M J J A S O N D Soils: Sand, sandy loam; particularly disturbed soils. IBRA Distribution: AVW, COO, ESP, JAF, SWA, WAR Florabase records: 52	Moderate
**Pinus canariensis*	No	Permitted - s11	-	-	-	Habit: Tree or (conifer), to 30 m high, leaves in threes, 15-30 cm long; female cones symmetrical, lacking spiny tips; seeds winged. Soils: Flat. Lateritic sandy clay. IBRA Distribution: JAF Florabase records: 2	Low
**Pinus pinaster*	No	Permitted - s11	-	-	-	Habit: Tree or (conifer), 2-40 m high, monoecious; leaves in pairs, 15-30 cm long; cones with numerous scales; seeds winged. Flowering period (indicated in green): J F M A M J J A S O N D Soils: Sand, grey sandy clay, loam. Gentle slopes, edge of tracks, disturbed land. IBRA Distribution: AVW, JAF, SWA, Florabase records: 13	Low
**Pinus radiata*	No	Permitted - s11	-	-	-	Habit: Tree or (conifer), 30-40 m high, monoecious; leaves in threes, 8-15 cm long; cones with numerous scales; seeds winged. Flowering period (indicated in green): J F M A M J J A S O N D Soils: Near plantations. IBRA Distribution: AVW, JAF, SWA, WAR Florabase records: 9	Low

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Plantago lanceolata*	No	Permitted - s11	-	-	-	Habit: Rosetted perennial, herb, 0.1-0.9 m high. Flower colour: green-yellow-brown Flowering period (indicated in green): **J F M** A M J J A S O **N D** Soils: Variety of soils. In gardens & other disturbed sites. IBRA Distribution: AVW, GES, JAF, NUL, SWA, WAR Florabase records: 68	Low
**Prunus persica* var. *nucipersica*	No	-	-	-	-	Habit: Erect shrub or small tree Flower colour: pink Flowering period (indicated in green): J F M A M J J A **S** O N D Soils: River edges, brown clay loam. IBRA Distribution: JAF, WAR Florabase records: 2	Low
**Pseudognaphalium luteoalbum*	No	-	-	-	-	Habit: Erect, densely lanate annual, herb, to 0.7 m high. Flower colour: yellow-white-cream Flowering period (indicated in green): J F M A **M J J A S O N D** Soils: Sand, loam, clay and peaty soils over limestone, granite, laterite, sandstone, gypsum. Plains, hillsides, riverbanks, wetlands, drainage areas. IBRA Distribution: AVW, CAR, CEN, COO, DAL, ESP, GAS, GES, GIB, GSD, GVD, JAF, LSD, MAL, MUR, NOK, NUL, PIL, SWA, TAN, WAR, YAL Florabase records: 212	Moderate

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE HOLYOAKE EAST SURVEY AREA

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Ranunculus muricatus*	No	Permitted - s11	-	-	-	Habit: Erect or prostrate annual, herb, 0.04-0.3 m high. Flower colour: yellow/green-yellow Flowering period (indicated in green): J F M A M J J **A S O N D** Soils: Peaty sand. Winter-wet situations, swamps or in running water. IBRA Distribution: JAF, SWA, WAR Florabase records: 49	Low
** Romulea rosea*	No	Permitted - s11	-	-	-	Habit: Cormous, perennial, herb, 0.1-0.4 m high. Flower colour: blue-pink Flowering period (indicated in green): J F M A M J J **A S O N** D Soils: White-grey sandy clay, brown-red sandy loam, black sandy clay, gravel, granite, limestone. Hills, roadsides, weed of crops and pastures. IBRA Distribution: AVW, ESP, GES, JAF, SWA, WAR Florabase records: 137	Moderate
** Rubus anglocandicans*	No	Declared Pest - s22(2)	C3 Management	Exempt	Whole of State	Habit: Scrambling, rampant, sprawling shrub, to 4 m high. Flower colour: pink/white Flowering period (indicated in green): **J F** M A M J J A S O **N D** Soils: Grey sand, red-brown gravelly loam, red clay loam, granite, limestone. Hillsides, along river banks and watercourses, in roadside drains. IBRA Distribution: JAF, SWA, WAR Florabase records: 99	Low

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
* *Rubus ulmifolius*	No	Declared Pest - s22(2)	C3 Management	Exempt	Whole of State	Habit: Straggling perennial, herb or shrub, to 4 m high. Flower colour: pink/white/blue/purple Flowering period (indicated in green): **J F** M A M J J A S O **N D** Soils: Along creeks & drains. IBRA Distribution: JAF, SWA, WAR Florabase records: 45	Low
**Salix* spp. except *S. babylonica, S. × calodendron & S. × reichardtii*	Yes	-	-	-	-	Habit: Deciduous shrub or tree Flower colour: cream/yellow Flowering period (indicated in green): J F M A M J J A S **O N** D Soils: - IBRA Distribution: - Florabase records: -	Low
* *Salvinia ×molesta*	Yes	Declared Pest, Prohibited - s12	C2 Eradication	Prohibited	Whole of State	Habit: Rhizomatous, herb or (fern), 0.05-0.2 m high, floating aquatic; leaves in whorls of 3: 2 floating leaves and 1 submerged root-like water-leaf. Flower colour: - Flowering period (indicated in green): J F M A M J J A S O N D Soils: Still or slow-flowing fresh water ponds and streams. IBRA Distribution: GES, JAF, PIL, SWA, VIB, WAR Florabase records: 18	Low
**Senecio vulgaris*	No	Permitted - s11	-	-	-	Habit: Erect, rather succulent annual, herb, 0.05-0.4(-0.75) m high. Flower colour: yellow Flowering period (indicated in green): **J F** M A M J **J A S O N D** Soils: Sandy soils. Cultivated or disturbed grounds. IBRA Distribution: JAF, SWA, WAR Florabase records: 28	Moderate

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE HOLYOAKE EAST SURVEY AREA

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Sisymbrium officinale*	No	Permitted - s11	-	-	-	Habit: Erect annual or biennial, herb, to 0.75 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O **N D** Soils: Still or slow-flowing fresh water ponds and streams. IBRA Distribution: JAF, MAL, SWA, WAR Florabase records: 7	Low
**Sonchus asper*	No	Permitted - s11	-	-	-	Habit: Erect, robust, spiny annual or biennial, herb, to 1.8 m high. Flower colour: yellow Flowering period (indicated in green): **J** F M A M J J A S **O N D** Soils: White to grey sand, brown clayey loam, black sandy loam, black clayey peat. Dunes, valleys, seasonally wet areas, watercourses, lakes and wetlands, disturbed sites. IBRA Distribution: GES, JAF, PIL, SWA, VIB, WAR Florabase records: 102	Low
**Sonchus oleraceus*	No	Permitted - s11	-	-	-	Habit: Erect annual, herb, to 1.5 m high. Flower colour: yellow Flowering period (indicated in green): **J F M A M J J A S O N D** Soils: Variety of soils. Weed of waste places & disturbed ground. IBRA Distribution: AVW, CAR, CER, DAL, ESP, GAS, GES, GVD, HAM, JAF, LSD, MAL, MUR, NUR, OVP PIL, SWA, VIB, WAR, YAL Florabase records: 436	High

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Sparaxis pillansii*	No	Permitted - s11	-	-	-	Habit: Cormous, perennial, herb, to 0.4 m high. Flower colour: red-purple-yellow Flowering period (indicated in green): J F M A M J J A S O N D Soils: Grey sand, brown-red loamy clay, gravel, laterite. Flats, hills, road verges, paddocks. IBRA Distribution: AVW, ESP, JAF, SWA, WAR Florabase records: 23	Low
**Stachys arvensis*	No	Permitted - s11	-	-	-	Habit: Ascending annual, herb, 0.06-0.3 m high. Flower colour: pink-purple Flowering period (indicated in green): J F M A M J J A S O N D Soils: Road verges, waste grounds. IBRA Distribution: AVW, GES, JAF, MAL, SWA, WAR Florabase records: 47	Low
**Stellaria media*	No	Permitted - s11	-	-	-	Habit: Sprawling annual, herb, 0.01-0.2 m high. Flower colour: white Flowering period (indicated in green): J F M A M J J A S O N D Soils: Weed of gardens & disturbed areas. IBRA Distribution: AVW, ESP, GES, JAF, SWA, WAR Florabase records: 36	Low
**Trifolium dubium*	No	Permitted - s11	-	-	-	Habit: Prostrate or decumbent annual, herb, to 0.2 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O N D Soils: White sand, yellow-orange loam, brown gravelly clay, laterite. Road verges, track edges, settled areas. IBRA Distribution: AVW, ESP, GES, JAF, MAL, SWA, WAR Florabase records: 78	Moderate

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Ursinia anthemoides*	No	Permitted - s11	-	-	-	Habit: Slender, erect annual, herb, 0.1-0.5 m high. Flower colour: yellow/orange/cream-white Flowering period (indicated in green): J F M A M J **J A S O N D** Soils: Weed of roadsides & waste places. IBRA Distribution: AVW, COO, GES, JAF, MAL, SWA, WAR, YAL Florabase records: 318	High
**Vellereophyton dealbatum*	No	Permitted - s11	-	-	-	Habit: Short-lived, erect to sprawling annual or perennial, herb, 0.05-0.4 m high. Flower colour: white-cream-yellow Flowering period (indicated in green): **J F M A M J J A S O N D** Soils: Variety of soils. Weed of damp places IBRA Distribution: AVW, COO, ESP, JAF, MAL, SWA, WAR Florabase records: 163	Low
**Verbena incompta*	No	-	-	-	-	Habit: Erect, woody herb Flower colour: purple Flowering period (indicated in green): **J** F M A M J J A S **O N D** Soils: Still or slow-flowing fresh water ponds and streams. IBRA Distribution: JAF, SWA, WAR Florabase records: 6	Low
**Vulpia bromoides*	No	Permitted - s11	-	-	-	Habit: Loosely tufted annual, grass-like or herb, 0.05-0.6 m high. Flower colour: green Flowering period (indicated in green): J F M A M J J A **S O N D** Soils: Sandy loam, sand. IBRA Distribution: AVW, COO, ESP, GES, JAF, MAL, SWA, WAR Florabase records: 57	Low

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SPECIES	WONS	WAOL LEGAL STATUS	WAOL CONTROL CATEGORY	WAOL CONTROL CATEGORY	DECLARED AREAS	DESCRIPTION AND HABITAT	OCCURANCE LIKELIHOOD
**Vulpia myuros*	No	Permitted - s11	-	-	-	Habit: Tufted annual, grass-like or herb, 0.07-0.7 m high. Flower colour: green Flowering period (indicated in green): J F M A M J **J A S O N** D Soils: Sand, loam, lateritic gravel. IBRA Distribution: AVW, COO, ESP, GES, JAF, MAL, MUR, SWA, VIB, WAR, YAL Florabase records: 253	High
**Wahlenbergia capensis*	No	Permitted - s11	-	-	-	Habit: Slender, erect or ascending annual, herb, 0.1-0.5 m high. Flower colour: blue/blue-green Flowering period (indicated in green): J F M A M J J A **S O N** D Soils: Sandy soils; disturbed areas, plains. IBRA Distribution: AVW, ESP, GES, JAF, MAL, SWA, WAR Florabase records: 102	Moderate