Appendix 8 – Flora and Vegetation Reports

FLORA AND VEGETATION

OF

MYARA SURVEY AREA

Prepared for:

ALCOA World Alumina Australia

Prepared by:

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1. SUMMARY

Mattiske Consulting Pty Ltd was commissioned to undertake botanical studies on the Myara survey area, Figure 1. The survey effort was considered to be very comprehensive over the survey area. This survey effort builds on some thirty or so years of similar mapping in the region and therefore the information as provided reflects a substantial local knowledge of the northern Jarrah forest.

A total of 590 vascular plant taxa from 70 plant families and 217 genera were recorded within the Myara survey area. Of these, thirty-five were introduced plant taxa. Dominant families include Fabaceae (86 taxa), Proteaceae (58 taxa), Myrtaceae (53 taxa), Asteraceae (32 taxa), Asparagaceae (29 taxa), Cyperaceae (25 taxa), Stylidiaceae (22 taxa), Ericaceae (22 taxa), Poaceae (19 taxa) and Dilleniaceace (18 taxa).

No Declared Threatened (Rare) Flora species gazetted under the *Wildlife Conservation Act* (1950-1980) were located on the Myara survey area. No endangered or vulnerable species, pursuant to s179 of the *Environment Protection and Biodiversity Conservation Act* (1999) were located during the survey.

Six Priority flora species were recorded within the Myara survey. This was increased to ten Priority flora species if the records from the Department of Environment and Conservation (2012a) are considered. The majority of the Priority species tend to occur on the granitic soils and near the fringes of the valleys which are not likely to be disturbed to any large extent by the proposed operations.

A total of twenty-three site-vegetation types were defined and mapped for the Myara survey area and were representative of Havel's site-vegetation types for the Northern Jarrah Forest Region (Havel 1975a, 1975b). None of these communities are listed at threatened ecological communities or priority ecological communities (Department of Environment and Conservation (2012c).

The representation of the site-vegetation types were considered in a local and regional context. This assessment highlighted the following site-vegetation types:

- the occurrence of the R, G1 and G2 site-vegetation types reflecting localized granite outcrops,
- the integrity of the valley systems (AC, CW, D, E, W) should be maintained wherever possible to maximize the diversity of habitats for fauna species and plant species diversity, and
- the occurrence of DG which reflected shallower soils on some of the lower valley slopes,
- the representation of the site-vegetation types PW and SW, which has implications for the management of the *Phytophthora cinnamomi* disease.

As the mining will not directly impact the majority of the R, G1, G2 and DG types the main consideration for planning purposes appears to relate to the PW and SW types that reflect local soil moisture on mid and upper slopes.

2. INTRODUCTION

2.1 Location

The Myara survey area is located in State Forest and is a north-easterly extension of the Huntly mining envelope operated by Alcoa of Australia Limited.

2.2 Climate

The Myara survey area occurs within the northern Jarrah Forest Region as described by Beard (1990). The climate is dry Mediterranean, with winter rainfall of 1000 - 1400 mm and 5-6 dry months per year (Beard 1990), Figure 2. The average rainfall for Dwellingup (near the survey area) is 1244.8 mm (Bureau of Meteorology 2012).

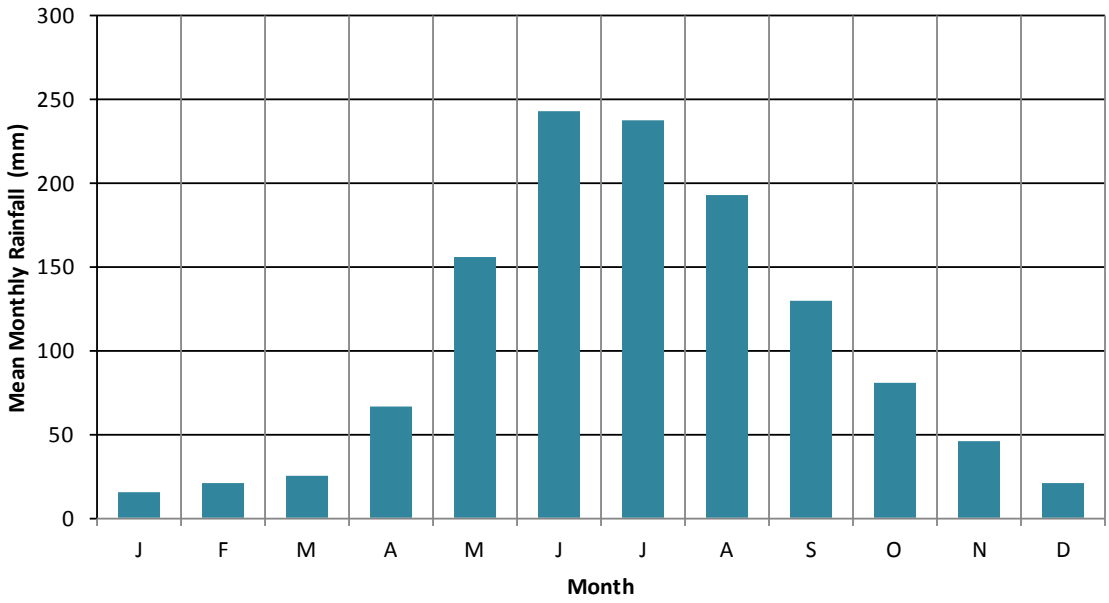

Figure 2: Mean Annual Rainfall, Dwellingup (Bureau of Meteorology 2012)

2.3 Landform and Soils

The Myara survey area occurs on the lateritic capped Archaean granite and metamorphic rocks of the Darling Plateau.

Churchward and McArthur (1980) undertook a study of the landforms and geology of the Darling System. The following landforms and soil units are represented in the survey area:

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

Murray - "Deeply incised valleys with red and yellow earths on slopes; narrow alluvial terraces."

Yarragil - "Valleys of the western part of the plateau; sandy gravels on the slopes; orange earth in swampy floors."

Cooke - "Hills arising above general plateau level; mainly mantled by laterite but with some rock crop."

2.4 Flora and Vegetation

The Myara survey area lies within the Darling Botanical District of the South-western Botanical Province as recognized by Diels (1906) and later developed by Gardner (1942) and Beard (1979, 1980).

Previous workers have stressed the significance of the climate, landforms and soils in determining the distribution of plant communities in this area (Diels 1906; Williams 1932, 1942; Speck 1952, 1958; Lange 1960; Churchill 1961, 1968; Smith 1974; Seddon 1972; Havel 1968, 1975a, 1975b; Heddle *et al*. 1980a; Beard 1981, Mattiske and Havel 1998).

In vegetation mapping it is necessary to define and map the plant communities into groups with common characteristics in structure and floristics. This grouping and classification has been achieved by:

- Havel on the Swan Coastal Plain (1968) and in the Northern Jarrah Forest (1975a, 1975b),
- Beard (1979) in the Pinjarra area (1:250,000),
- Heddle *et al*. (1980a) in the System 6 area; Perth, Pinjarra and Collie areas (1:250,000), and
- Mattiske and Havel (1998) in the vegetation mapping for the Regional Forest Agreement.

The classification system of Heddle *et al*. (1980a), which utilized the concept of vegetation complexes, emphasized the relationships between the underlying landforms, soils and the plant communities. This latter system incorporated linkages with the previous work by Havel (1975a and b).

The areas inspected occurs near the interface between Dwellingup 1 and Dwellingup 2 vegetation complexes and near the interface between the Yarragil 1 and Yarragil 2 vegetation complexes and localized representation of the Cooke vegetation complex on shallow soils as defined by Mattiske and Havel (1998), namely:

Dwellingup 1 (D1) - Open forest of *Eucalyptus marginata* subsp. *marginata - Corymbia calophylla* on lateritic uplands in mainly humid and subhumid zones. Dominant vegetation-site types S, T; less consistently O, P and R.

Dwellingup 2 (D2) - Open forest of *Eucalyptus marginata* subsp. *marginata - Corymbia calophylla* on lateritic uplands in subhumid and semiarid zones. Dominant site-vegetation types P, S; less consistently T and R.

Murray (My1) - Open forest of *Eucalyptus marginata* subsp. *marginata – Corymbia calophylla - Eucalyptus patens* and *Eucalyptus megacarpa* on valley floors to woodland of Eucalyptus rudis – Melaleuca rhaphiophylla on the valley floors in humid to subhumid zones. Dominant vegetation types C, Q, U, T: less consistently D, W.

Yarragil 1 (Yg1) – Open forest of *Eucalyptus marginata* subsp. *marginata – Corymbia calophylla* on slopes with admixtures of *Eucalyptus patens* and *Eucalyptus megacarpa* on valley floors in humid and subhumid zones. Dominant vegetation types C, D, W; less consistently Q, T, U.

Yarragil 2 (Yg2) – Open forest of *Eucalyptus marginata* subsp. *marginata – Corymbia calophylla* on slopes and *Eucalyptus patens* on valley floors in subhumid and semiarid zones. Dominant vegetation types A, C, D, W; less consistently T and S.

Cooke (Ce) - Mosaic of open forest of *Eucalyptus marginata* subsp. *marginata – Corymbia calophylla* (subhumid zone) and open forest of *Eucalyptus marginata* subsp. *thalassica – Corymbia calophylla* (semiarid and arid zones) and on deeper soils adjacent to outcrops, closed heath of Myrtaceae-Proteaceae species and lithic complex on granite rocks and associated soils in all climate zones with some *Eucalyptus laeliae* (semiarid) and *Allocasuarina huegeliana* and *Eucalyptus wandoo* (mainly semiarid to perarid zones). Dominant vegetation types G, R; less consistently T, S and P.

The Dwellingup 1 (D1) vegetation complex is represented in the reserve system with 14.7% included in the formal and informal reserves (see Forest Management Plan, data supplied by Department of Conservation and Land Management – July 2003).

The Dwellingup 2 (D2) vegetation complex is represented in the reserve system with 23.0% included in the formal and informal reserves (see Forest Management Plan, data supplied by Department of Conservation and Land Management – July 2003).

The Murray 1 (My1) vegetation complex is relatively well represented in the reserve system with 36.0% included in the formal and informal reserves (see Forest Management Plan, data supplied by Department of Conservation and Land Management – July 2003).

The Yarragil 1 (Yg1) vegetation complex is relatively well represented in the reserve system with 29.9% included in the formal and informal reserves (see Forest Management Plan, data supplied by Department of Conservation and Land Management – July 2003).

The Yarragil 2 (Yg2) vegetation complex is relatively well represented in the reserve system with 31.7% included in the formal and informal reserves (see Forest Management Plan, data supplied by Department of Conservation and Land Management – July 2003). This vegetation complex varies from Yarragil 1 mainly in the replacement of *Eucalyptus megacarpa* with *Eucalyptus patens* and the extent of the swamp (S) vegetation within the broader Yarragil 2 valley systems. The Swamp (S) vegetation complex was only mapped at the regional scale when the swamps were significantly large to warrant presentation at 1:250,000.

The Cooke (Ce) vegetation complex is relatively well represented in the reserve system with 34.8% included in the formal and informal reserves (see Forest Management Plan, data supplied by Department of Conservation and Land Management – July 2003).

The site-vegetation types on this area have been mapped previously by Mattiske Consulting Pty Ltd in work undertaken for Alcoa of Australia Limited based on Havel (1975a and 1975b). The dominant site-vegetation types on the slopes include S, P and T (and variants of these types such as SP, PS, ST, TS), narrow strips of W, D, DA and CW on the lower slopes, A and AC on the broader valley flats and R and G on the shallow soils near outcropping. All of these site-vegetation types are well represented in the conservation estate within the northern Jarrah forest.

It is not possible to assess the representation of these site-vegetation types at a regional scale as only sections of the Jarrah forest have been mapped at this finer scale of definition. Therefore it is necessary to rely on previous mapping for Alcoa and other organizations in defining the degree of representation. The earlier publications by Heddle *et al.* (1980b) reviewed some of the representation in broad terms for these site-vegetation types.

3. OBJECTIVES

The objectives of the study were:

- to describe and map the native vegetation on the forest areas of the proposed Myara survey area,
- to review the local and regional significance of the site-vegetation types in the survey area,
- to submit the baseline data for the vegetation maps to Alcoa of Australia Limited in a format suitable for integration into the Alcoa system,
- to examine the conservation status of flora within the survey area on a local and regional scale,
- to produce a comprehensive species list for the Myara survey area,
- to provide potential dieback information in a database format for the survey area, and
- to prepare a report summarising the findings.

4. METHODS

4.1 Flora

The detailed recording of the vascular plant species was carried out in conjunction with the vegetation mapping program for the Myara survey area.

All plant specimens which were collected during the field programme were dried and fumigated in accordance with the requirements of the West Australian Herbarium, and then sorted in readiness for identification.

Plant specimens were identified by the use of local and regional flora keys and by comparison with the named specimens held at the West Australian Herbarium. Plant taxonomists who are considered to be an authority on a particular plant group were consulted, when necessary.

The conservation status of all recorded flora was also checked against the current lists managed by the Department of Environment and Conservation (2012a).

4.2 Vegetation

The Myara survey area recordings were undertaken on a grid system of 120m x 120m.

At each recording site the following information was collected:

Pegging	(pegging layout used by Alcoa of Australia Limited)
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; quantity - numerous, moderate, few)
Logging History	(intensity - heavy, moderate, light; quantity - number of stumps within a 20 metre radius)
Fire	(years since last fire)
Tracks	(forestry roads, snigging tracks formations - old or recent presence of physical disturbances)
Tree Deaths	(possible cause of death, e.g. drought, fire, ring-barking of trees, presence of fungal diseases e.g. *Phytophthora*, *Armillaria*)
Dieback Occurrence	(*Phytophthora* spp.) (demarcation- field blazing, coloured flagging on trees vegetation deaths - old or recent)

Recordings were made at 6950 sites in the period between 2008 and 2010 and an additional 3974 sites were recorded in 2011 and 2012.

Species were ranked according to the scale developed by Havel (1975a):

Tree species
Assessments were undertaken within a 20 metre radius from the observation point.

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

Understorey species
Assessments were undertaken within a 5 metre radius from the observation point.

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

The physiological stress was determined for each species within an area of 20 metres radius from the observation point and ranked according to the following scale. The above system was developed by E.M. Mattiske and Associates and has been used previously in the northern Jarrah forest:

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

A further subdivision of the time period since death was undertaken for stress levels greater than 3:

R - Recent death (leaves recently desiccated or discoloured)
M - Medium death (Bark but no leaves left on trees)
O - Old death (no leaves or bark left on trees)

4.3 Vegetation Mapping

The vegetation mapping utilised:

. the field data collected in 2008, 2009, 2010, 2011 and 2012; and,
. foot road and track traverses and opportunistic field observations.

The vegetation map was compiled by Mattiske Consulting Pty Ltd and the maps compiled by CAD Resources for Mattiske Consulting Pty Ltd and Alcoa of Australia Limited.

5. RESULTS

5.1 Flora

A total of 590 vascular plant taxa from 70 plant families and 217 genera were recorded within the Myara survey area (Appendix B). Of these, thirty-five were introduced plant taxa. Dominant families include Fabaceae (86 taxa), Proteaceae (58 taxa), Myrtaceae (53 taxa), Asteraceae (32 taxa), Asparagaceae (29 taxa), Cyperaceae (25 taxa), Stylidiaceae (22 taxa), Ericaceae (22 taxa), Poaceae (19 taxa) and Dilleniaceace (18 taxa).

5.2 Threatened (Rare) and Priority Flora Species

No Declared Threatened (Rare) Flora species gazetted under the *Wildlife Conservation Act* (1950-1980) were located on the Myara survey area. No endangered or vulnerable species, pursuant to s179 of the *Environment Protection and Biodiversity Conservation Act* (1999) were located during the survey.

Six Priority flora species were recorded within the Myara survey (Tables 1 to 6 and Figure 3). [Note: Figure 3 is included as a folder map in the back of the report.]

The six Priority flora species was increased to ten Priority flora species if the records from the Department of Environment and Conservation (2012a) are considered (see Figure 3). The additional four Priority flora species were only recorded at a few locations (Table 1) and included *Acacia oncinophylla* subsp. *patulifolia* (Priority 3), *Pimelea rara* (Priority 4), *Grevillea pimeleoides* (Priority 4) and *Hemigenia rigida* (Priority 1).

In addition locations for *Cyathochaeta teretifolia* (Priority 3) and *Stylidium ireneae* (Priority 4) were also recorded by the Department of Environment and Conservation (2012a).

Table 1: Summary of Locations of Priority flora species as extracted from Department of Environment and Conservation records (2012a)

Species	Easting (MGA94)	Northing (MGA94)
Acacia oncinophylla subsp. *patulifolia* (P3)	410811	6400513
Cyathochaeta teretifolia (P3)	410340	6405480
Grevillea pimeleoides (P4)	413934	6413565
Grevillea pimeleoides (P4)	414169	6411700
Hemigenia rigida (P1)	411603	6406442
Pimelea rara (P4)	413203	6411660
Pimelea rara (P4)	414611	6410829
Pimelea rara (P4)	413063	6411617
Stylidium ireneae (P4)	414068	6408219

Acacia drummondii subsp. *affinis* (Priority 3) occurs in the northern Jarrah forest (Department of Environment and Conservation 2012a). This taxon is known from 32 records at the State Herbarium (Department of Environment and Conservation 2012a). This species may be influenced by proposed operations as it occurs on lateritic gravelly soils. This species was recorded at four locations, Table 2.

Table 2: Summary of Locations of *Acacia drummondii* subsp. *affinis* (Priority 3)

Species	Easting (MGA94)	Northing (MGA94)
Acacia drummondii subsp. *affinis*	410719	6407909
Acacia drummondii subsp. *affinis*	410719	6407789
Acacia drummondii subsp. *affinis*	410839	6407789
Acacia drummondii subsp. *affinis*	411079	6407669

Acacia oncinophylla subsp. patulifolia (Priority 3) occurs in the northern Jarrah forest, on the nearby Swan Coastal Plain and on the Darling Scarp (Department of Environment and Conservation 2012a). This taxon is known from 30 records at the State Herbarium (Department of Environment and Conservation 2012a). This species is less likely to be influenced by proposed operations as it occurs on mainly granitic soils and only occasionally on lateritic gravelly soils. This species has been recorded previously in the southern section of the survey area and was evident from records managed by the Department of Environment and Conservation, 2012, Table 1 and Figure 3.

Calothamnus rupestris (Priority 4) occurs in the northern Jarrah forest (Department of Environment and Conservation 2012a). This taxon is known from 63 records at the State Herbarium (Department of Environment and Conservation 2012a). This species is less likely to be influenced by proposed operations as it occurs on mainly granitic soils and near rock outcrops. This species was recorded at a range of locations, Table 3, Figure 3.

Table 3: Summary of Locations of *Calothamnus rupestris* (Priority 4)

Species	Easting (MGA94)	Northing (MGA94)	Easting (MGA94)	Northing (MGA94)
Calothamnus rupestris	411439	6411741	412999	6413069
Calothamnus rupestris	411679	6412229	412999	6412829
Calothamnus rupestris	412040	6404074	412999	6412709
Calothamnus rupestris	412159	6411749	412999	6412589
Calothamnus rupestris	412159	6410909	412999	6412229
Calothamnus rupestris	412159	6410789	412999	6409589
Calothamnus rupestris	412159	6410669	413119	6413429
Calothamnus rupestris	412399	6411869	413119	6413309
Calothamnus rupestris	412519	6411869	413119	6413189
Calothamnus rupestris	412519	6411149	413119	6412829
Calothamnus rupestris	413119	6412589	413359	6413549
Calothamnus rupestris	413119	6412469	413359	6413429
Calothamnus rupestris	413119	6412349	413359	6411989
Calothamnus rupestris	413239	6413189	413359	6411269
Calothamnus rupestris	413239	6413069	413359	6411149
Calothamnus rupestris	413239	6412229	413479	6411869
Calothamnus rupestris	413239	6411989	413599	6412709
Calothamnus rupestris	413239	6411869	413599	6411869
Calothamnus rupestris	413239	6411749	413599	6411149
Calothamnus rupestris	413239	6411629	413719	6412109
Calothamnus rupestris	413719	6411989	413959	6411629
Calothamnus rupestris	413719	6411869	414079	6411629
Calothamnus rupestris	413719	6411749	414199	6411869
Calothamnus rupestris	413719	6411629	414559	6406709
Calothamnus rupestris	413719	6411509	414679	6412589
Calothamnus rupestris	413719	6410669	414799	6413069
Calothamnus rupestris	413839	6412709	414799	6412949
Calothamnus rupestris	413839	6411869	414839	6413062
Calothamnus rupestris	413839	6411749	415279	6412709
Calothamnus rupestris	413959	6411749	415399	6412709
Calothamnus rupestris	413719	6411989	413959	6411629
Calothamnus rupestris	415399	6412589	415519	6412589
Calothamnus rupestris	415519	6413069	415639	6412589

Cyathochaeta teretifolia (Priority 3) occurs in the northern Jarrah forest, on the nearby Swan Coastal Plain and southwards on the Blackwood Plateau and the southern coastal areas (Department of Environment and Conservation 2012a). This taxon is known from 36 records at the State Herbarium (Department of Environment and Conservation 2012a). This species is less likely to be influenced by proposed operations as it occurs on the sandy and clay loam fringes of creeklines and swamps. This species was recorded at one location by Mattiske Consulting (Table 4) and also by the Department of Environment and Conservation (Table 1).

Table 4: Summary of Locations of *Cyathochaeta teretifolia* (Priority 3)

Species	Easting (MGA94)	Northing (MGA94)
Cyathochaeta teretifolia	410479	6405629

Grevillea pimeleoides (Priority 4) occurs in the north-western section of the Jarrah forest within the southwest of Western Australia (Department of Environment and Conservation 2012a). This taxon is known from 33 records at the State Herbarium (Department of Environment and Conservation 2012a). This taxon within the survey area is based on records from the Department of Environment and Conservation (2012a), Table 1. This taxon is unlikely to be disturbed by mining activities, as it occurs on shallow soils over granite.

Hemigenia rigida (Priority 1) occurs in the Jarrah forest and southern coastal areas within the southwest of Western Australia (Department of Environment and Conservation 2012a). This taxon is known from 97 records at the State Herbarium (Department of Environment and Conservation 2012a). This taxon within the survey area is based on the record from the Department of Environment and Conservation (2012a), Table 1. This taxon may be disturbed by mining activities, although it extends from gravelly lateritic soils to granite outcrops.

Pimelea rara (Priority 4) occurs in the north-western section of the Jarrah forest within the southwest of Western Australia (Department of Environment and Conservation 2012a). This taxon is known from 52 records at the State Herbarium (Department of Environment and Conservation 2012a). This taxon within the survey area is based on records from the Department of Environment and Conservation (2012a), Table 1. This taxon may be disturbed by mining activities, as it occurs on lateritic soils.

Senecio leucoglossus (Priority 4) occurs in the northern Jarrah forest and has previously been recorded mainly in the central and northern Jarrah forest from Mundaring, Harvey, Mt Saddleback and the Darling Range (Department of Environment and Conservation 2012a). This taxon is known from 40 records at the State Herbarium (Department of Environment and Conservation 2012a). This taxon was recorded in a range of site-vegetation types, Table 5. This taxon may be disturbed by mining activities, although it extends from gravelly lateritic soils to granite outcrops. This species has been recorded relatively regularly in the northern Jarrah Forest.

Table 5: Summary of Locations of *Senecio leucoglossus* (Priority 4)

Species	Easting (MGA94)	Northing (MGA94)	Easting (MGA94)	Northing (MGA94)
Senecio leucoglossus	409634	6400708	417803	6409348
Senecio leucoglossus	409995	6400949	418757	6404792
Senecio leucoglossus	410119	6410069	418762	6405032
Senecio leucoglossus	410122	6400952	419350	6407793
Senecio leucoglossus	410719	6399996	419352	6405626
Senecio leucoglossus	411074	6399864	419479	6407789
Senecio leucoglossus	411078	6399983	419599	6407789
Senecio leucoglossus	412278	6401184	419716	6407668
Senecio leucoglossus	412875	6399991	419719	6407429
Senecio leucoglossus	412995	6400354	419959	6407792
Senecio leucoglossus	413959	6407309	420119	6411596
Senecio leucoglossus	414439	6413069	420554	6406586
Senecio leucoglossus	414439	6412949	420679	6406589
Senecio leucoglossus	414439	6412829	420679	6406351
Senecio leucoglossus	414561	6401194	420680	6406465
Senecio leucoglossus	414678	6401187	420790	6406354
Senecio leucoglossus	414797	6401550	420794	6405748
Senecio leucoglossus	414800	6401192	420799	6406586
Senecio leucoglossus	414915	6401191	420807	6405884
Senecio leucoglossus	414916	6401069	420919	6406709
Senecio leucoglossus	414919	6408149	420922	6406947
Senecio leucoglossus	415039	6401073	420925	6406348
Senecio leucoglossus	415402	6402260	421434	6409900

Stylidium ireneae (Priority 4) occurs in the northern Jarrah forest and has previously been recorded mainly in the northern Jarrah forest although it has also been recorded near Augusta in the southwest (Department of Environment and Conservation 2012a). This taxon is known from 20 records at the State Herbarium (Department of Environment and Conservation 2012a). This taxon was recorded on the lower slopes of the valley systems on the fringes of the creeklines, Table 6, Figure 3. This taxon is unlikely to be disturbed by mining activities as it occurs in areas that will minimal disturbance.

Table 6: Summary of Locations of *Stylidium ireneae* (Priority 4)

Species	Easting (MGA94)	Northing (MGA94)
Stylidium ?ireneae	410002	6403827
Stylidium ?ireneae	413116	6400952
Stylidium ?ireneae	413121	6401188
Stylidium ?ireneae	415636	6401188
Stylidium ireneae	409645	6403709
Stylidium ireneae	409888	6402616
Stylidium ireneae	415030	6400594
Stylidium ireneae	415527	6402888
Stylidium ireneae	416005	6403105
Stylidium ireneae	418757	6404552

Stylidium longitubum (Priority 3) occurs in the northern Jarrah forest and has previously been recorded mainly in the northern Jarrah forest although it has also been recorded southwards and northwards in the southwest (Department of Environment and Conservation 2012a). This taxon is known from 33 records at the State Herbarium (Department of Environment and Conservation 2012a). This taxon was recorded on the lower sandy clays and clays of the valley systems on the fringes of the creeklines, Table 7, Figure 3. This taxon is unlikely to be disturbed by mining activities as it occurs in areas that will minimal disturbance.

Table 7: Summary of Locations *of Stylidium longitubum* (Priority 3)

Species	Easting (MGA94)	Northing (MGA94)
Stylidium longitubum	415282	6402872
Stylidium longitubum	415405	6402873
Stylidium longitubum	415757	6402986

The Priority species are concentrated largely near granite outcrops and near the valley floors. Both of these main habitats will be avoided during the proposed operations.

5.3 Other Species of Interest

In previous reports *Aotus cordifolia* was recognized as a Priority species, this taxon is no longer listed as a Priority species.

A range of species associated with the granite outcrops and the G1, G2 and R site-vegetation types are locally significant as many are restricted to these shallow soils associated with the granitic soils.

5.4 Vegetation

A total of nineteen site-vegetation types were defined and mapped for the Myara survey area and were representative of Havel's site-vegetation types for the Northern Jarrah Forest Region (Havel 1975a, 1975b), Figure 4 [Note: Figure 4 enclosed as folded map in back of report] and Appendix C.

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.

This mapping combination is a variant of the site-vegetation types A and C as defined by Havel (1975a). The A and C types are often mapped in conjunction with other types as the C site-vegetation type may be as narrow as 5 to 10 metres and the A type is quite variable. The difference between C and A reflects a subtle difference in the width of the drainage patterns within the Yarragil valley systems. This site-vegetation type occurs in the wider swamp areas of the western valley floors which are dominated by loamy soils in the Darling Ranges. It occurs in other conservation areas, although by its very nature is narrow in its distribution as it follows streams and rivers (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by sedges and specific shrub species which dominate the wetter swamp areas.

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.

This type is a variant of site-vegetation types C and W as defined by Havel (1975a) and in part reflects the narrow linear nature of the C type and the need to combine this type with the type W for mapping purposes (CW). This type occurs within the Murray and Yarragil complexes as defined by Heddle *et al.* (1980a).

This site-vegetation type occurs in the gullies and creek-beds of the western valley floors which are dominated by loamy soils in the Darling Ranges. This site-vegetation type occurs in other conservation areas (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987) and tends to be dominated by sedges and specific shrub species which dominate the wetter lower slopes and creek-beds (e.g. *Astartea scoparia* and *Taxandria linearifolia*), as well as species which reflect the moister and fertile slopes of the valley systems (e.g. *Hypocalymma angustifolium, Eucalyptus patens* and *Acacia extensa* of site-vegetation type W).

W - Open Forest of *Eucalyptus megacarpa - Eucalyptus patens – Corymbia calophylla* on lower slopes with mixed low understorey species, including *Acacia extensa* and *Hypocalymma angustifolium* on seasonally moister sandy-loam gravelly soils.

This is equivalent to site-vegetation type W as defined by Havel (1975a). This type occurs within the Murray and Yarragil complexes as defined by Heddle *et al.* (1980a). This site-vegetation type occurs on the lower, more fertile slopes with loamy soils of the western valley systems in the Darling Ranges. This site-vegetation type occurs in other conservation areas (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific shrub species which dominate the moister and more fertile lower slopes of the valley systems (e.g. *Hypocalymma angustifolium, Eucalyptus patens* and *Acacia extensa* of site-vegetation type W).

Q - Open Forest of *Eucalyptus patens – Eucalyptus marginata - Corymbia calophylla* on lower slopes with mixed low understorey species, including *Trymalium odoratissimum* subsp. *odoratissimum, Hypocalymma angustifolium and Pteridium esculentum* on seasonally moister loamy soils.

This is equivalent to site-vegetation type Q as defined by Havel (1975a). This type occurs within the Murray complexes as defined by Heddle *et al.* (1980a). This site-vegetation type occurs on the more dissected lower, more fertile slopes with loamy soils of the western valley systems in the Darling Ranges. This site-vegetation type occurs in other conservation areas (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific shrub species which dominate the moister and more fertile lower slopes of the valley systems (e.g. *Trymalium odoratissimum* subsp. *odoratissimum, Hypocalymma angustifolium* and *Eucalyptus patens* of site-vegetation type Q).

D - Open Forest of *Eucalyptus marginata - Corymbia calophylla – Hakea prostrata* on lower slopes with mixed low understorey species, including *Babingtonia camphorosmae* and *Acacia extensa* on clay loams to gravelly clay-loams.

This is equivalent to site-vegetation type D as defined by Havel (1975a). This type occurs mainly within the Yarragil and Swamp complexes as defined by Heddle *et al.* (1980a). This site-vegetation type occur on the lower, less fertile slopes with sandy-clays to clay loams on the western valley systems in the Darling Ranges and also occur in other conservation areas (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific shrub species, which dominate the moister and less fertile lower slopes of the valley systems (e.g. *Hypocalymma angustifolium* and *Babingtonia camphorosmae* of site-vegetation type D).

DG - Woodland of E*ucalyptus marginata -Corymbia calophylla* on lower slopes with mixed low understorey species, including *Grevillea bipinnatifida, Hypocalymma angustifolium, Babingtonia camphorosmae* and *Acacia extensa* on sandy-loams over shallow outcropping.

This type is a variant of site-vegetation types D and G as defined by Havel (1975a). This variant type occurs mainly within the Yarragil and Swamp complexes as defined by Heddle *et al.* (1980a). This type occurs on the lower, less fertile slopes with sandy to sandy-clays over shallow soils on the western and central valley systems in the Darling Ranges and also occur in other conservation areas (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific shrub species, which dominate the moister and less fertile lower slopes of the valley systems (e.g. *Hakea prostrata, Banksia littoralis*, *Hypocalymma angustifolium, Grevillea bipinnatifida* and *Babingtonia camphorosmae*).

DA - Woodland of *Eucalyptus marginata - Banksia littoralis – Hakea prostrata* on lower slopes with mixed low understorey species, including *Babingtonia camphorosmae* and *Acacia extensa* on moister sandy-loams.

This type is a variant of site-vegetation types D and A as defined by Havel (1975a). This variant type occurs mainly within the Yarragil and Swamp complexes as defined by Heddle *et al.* (1980a). This type occurs on the lower, less fertile slopes with sandy to sandy-clays on the western and central valley systems in the Darling Ranges and also occur in other conservation areas (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific shrub species, which dominate the moister and less fertile lower slopes of the valley systems (e.g. *Hakea prostrata, Banksia littoralis*, *Hypocalymma angustifolium* and *Babingtonia camphorosmae*).

E - Open Forest to Woodland of *Eucalyptus marginata - Corymbia calophylla* with scattered understorey, including *Kingia australis, Adenanthos barbiger* and low shrubs, herbs and sedges on sandy gravels.

This type is equivalent to the site-vegetation type E as defined by Havel (1975a). This variant type occurs mainly within the Yarragil and Swamp complexes as defined by Heddle *et al.* (1980a).

This type occurs on the lower, less fertile slopes with sandy to sandy-gravelly soils on the western and central valley systems in the Darling Ranges. This type occurs in local valley systems in a patchy mosaic with types D and P and also occurs in other conservation areas (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific shrub species, which dominate the moister and less fertile lower slopes of the valley systems (e.g. *Kingia australis, Adenanthos barbiger* and a range of low shrubs).

P - Open Forest of *Allocasuarina fraseriana - Eucalyptus marginata - Corymbia calophylla* with scattered understorey, including *Grevillea wilsonii*, *Adenanthos barbiger* and low shrubs, herbs and sedges on sandy gravels.

This type is equivalent to the site-vegetation type E as defined by Havel (1975a). This type occurs within the Dwellingup, Dwellingup-Hester and Yarragil complexes as defined by Heddle *et al.* (1980a).

This site-vegetation type occurs on the slopes of the undulating hills on the Darling Ranges. This site-vegetation type appears to be reflecting a change in the local plant communities within the survey area as the drier sandy to sandy-gravel soils. The type is well represented in the conservation estate (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific shrub species which dominate the sandy-gravelly slopes of the Darling Ranges (e.g. *Lechenaultia biloba, Allocasuarina fraseriana* (formerly *Casuarina fraseriana), Adenanthos barbiger, Grevillea wilsonii* and *Banksia grandis* of site-vegetation type P).

PG - Open Forest of *Allocasuarina fraseriana - Eucalyptus marginata - Corymbia calophylla* with scattered understorey, including *Grevillea wilsonii*, *Adenanthos barbiger* and *Grevillea bipinnatifida* on sandy-loams over shallow outcropping.

This type is a variant of site-vegetation types P and G as defined by Havel (1975a) due to the presence of shallower soils indicators such as *Grevillea bipinnatifida* and *Hakea undulata*). This type occurs within the Dwellingup, Dwellingup-Hester and Yarragil complexes as defined by Heddle *et al.* (1980a).

This site-vegetation type occurs on the slopes associated with the fringes of shallower soils on the undulating hills on the Darling Ranges. The type is well represented in the conservation estate as it appears to be a local variant of the P site-vegetation type (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific shrub species which dominate the sandy-gravelly slopes and shallower soils associated with granite outcrops of the Darling Ranges (e.g. *Lechenaultia biloba, Allocasuarina fraseriana* (formerly *Casuarina fraseriana), Adenanthos barbiger* and *Banksia grandis* of site-vegetation type P and *Grevillea bipinnatifida* and other species associated with shallow granitic soils of the site-vegetation type G).

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.

This type is a variant of site-vegetation types P and W as defined by Havel (1975a) due to the presence of moisture indicators such as *Hypocalymma angustifolium* and *Babingtonia camphorosmae*). This type occurs within the Dwellingup, Dwellingup-Hester and Yarragil complexes as defined by Heddle *et al.* (1980a).

This site-vegetation type occurs on the lower slopes and less commonly the mid slopes of the undulating hills on the Darling Ranges. This site-vegetation type appears to be reflecting a change in the local plant communities within the survey area as the moister indicators are occurring in sandier soils and higher up in the landscape. The type is not well represented in the conservation estate as it appears to be a local variant of the P site-vegetation type (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific shrub species which dominate the sandy-gravelly slopes and moist soil conditions of the Darling Ranges (e.g. *Lechenaultia biloba, Allocasuarina fraseriana* (formerly *Casuarina fraseriana), Adenanthos barbiger* and *Banksia grandis* of site-vegetation type P and *Hypocalymma angustifolium* and *Babingtonia camphorosmae* of the site-vegetation type W which dominates moister soils in the nearby forest areas).

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.

This site type is a variant of the site-vegetation types P and T as defined by Havel (1975a). This type occurs within the Dwellingup-Hester complex as defined by Heddle *et al.* (1980a). This site-vegetation type occurs on the mid to upper slopes of the undulating hills on the Darling Ranges. This combined type of types P and T is relatively restricted in distribution within the Northern Jarrah Forest and is poorly represented in the conservation estate (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987).

This site-vegetation type tends to be dominated by specific shrub species which dominate the sandy-gravelly slopes of the Darling Ranges (e.g. *Allocasuarina fraseriana, Adenanthos barbiger, Pteridium esculentum, Leucopogon verticillatus, Bossiaea aquifolium* subsp. *aquifolium* and *Banksia grandis* of site-vegetation types P and T) but which lack some of the key indicators of the P type (e.g. *Grevillea wilsonii*) and includes species which occur on the gravelly soils (*Hovea chorizemifolia* and *Leucopogon verticillatus*).

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.

This site type is a variant of the site-vegetation types P and S as defined by Havel (1975a). This type occurs within the Dwellingup and Dwellingup-Hester complexes as defined by Heddle *et al.* (1980a).

The PS site-vegetation type occurs on the mid to upper slopes of the undulating hills on the Darling Ranges. This combined type of types P and S is relatively widespread in distribution within the Northern Jarrah Forest and is well represented in the conservation estate (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987).

This site-vegetation type tends to be dominated by specific shrub species which dominate the sandy-gravelly slopes of the Darling Ranges (e.g. *Allocasuarina fraseriana, Adenanthos barbiger, Leucopogon propinquus* and *Banksia grandis* of site-vegetation types P and S) but which lack some of the key indicators of the P type (e.g. *Grevillea wilsonii*) and includes species which occur on the gravelly soils (*Hovea chorizemifolia* and *Leucopogon capitellatus*).

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.

This site type is a variant of the site-vegetation types S and P as defined by Havel (1975a). This type occurs within the Dwellingup and Dwellingup-Hester complexes as defined by Heddle *et al.* (1980a). This site-vegetation type occurs on the mid to upper slopes of the undulating hills on the Darling Ranges. This combined type of types S and P is relatively widespread in distribution within the Northern Jarrah Forest and is well represented in the conservation estate (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific shrub species which dominate the sandy-gravelly slopes of the Darling Ranges (e.g. *Allocasuarina fraseriana, Adenanthos barbiger, Leucopogon propinquus* and *Banksia grandis* of site-vegetation types P and S) but which tend towards the gravel end of the continuum as reflected by some of the key indicators of the S type (e.g. *Hovea chorizemifolia* and *Leucopogon capitellatus*).

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.

This type is equivalent to the site-vegetation type S as defined by Havel (1975a). This type occurs within the Dwellingup and Dwellingup-Hester complexes as defined by Heddle *et al.* (1980a). This site-vegetation type occurs on the upper slopes, and to a lesser degree mid slopes, of the undulating hills on the Darling Ranges. The type is widespread in distribution within the Northern Jarrah Forest and is well represented in the conservation estate (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific shrub species which dominate the gravelly slopes of the Darling Ranges (e.g. *Adenanthos barbiger, Leucopogon propinquus*, *Styphelia tenuiflora, Leucopogon capitellatus, Banksia grandis* and *Hovea chorizemifolia*).

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.

This type is a variant of site-vegetation types S and W as defined by Havel (1975a) due to the presence of moisture indicators such as *Hypocalymma angustifolium* and *Babingtonia camphorosmae*). This type occurs within the Dwellingup, Dwellingup-Hester and Yarragil complexes as defined by Heddle *et al.* (1980a).

This site-vegetation type appears to be reflecting a change in the local plant communities within the survey area as the moister indicators are occurring in gravelly soils and higher up in the landscape. This type is not well represented in the conservation estate as it appears to be a local variant of the S site-vegetation type (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987).

This site-vegetation type tends to be dominated by specific shrub species which dominate the gravelly slopes and moist soil conditions of the Darling Ranges (e.g. *Leucopogon capitellatus, Leucopogon propinquus, Hovea chorizemifolia, Adenanthos barbiger* and *Banksia grandis* of site-vegetation type S and *Hypocalymma angustifolium* and *Babingtonia camphorosmae* of the site-vegetation type W which dominates moister soils in the nearby forest areas).

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.

This type is a variant of site-vegetation types S and T as defined by Havel (1975a)). This type occurs within the Dwellingup and Dwellingup-Hester complexes as defined by Heddle *et al.* (1980a).

This site-vegetation type occurs on the upper slopes, and to a lesser degree mid slopes, of the undulating hills on the Darling Ranges. This type is widespread in distribution within the Northern Jarrah Forest and is well represented in the conservation estate (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific shrub species which dominate the loamy-gravelly slopes of the Darling Ranges (e.g. *Bossiaea aquifolium* subsp. *aquifolium*, *Leucopogon propinquus*, *Styphelia tenuiflora, Leucopogon capitellatus, Lasiopetalum floribundum* and *Hovea chorizemifolia*).

TP - Open Forest of *Eucalyptus marginata - Corymbia calophylla - Banksia grandis – Allocasuarina fraseriana* with scattered understorey, including *Clematis pubescens, Pteridium esculentum, Adenanthos barbiger, Leucopogon verticillatus* and *Bossiaea aquifolium* subsp. *aquifolium* on sandy-loam gravels.

This site type is a variant of the site-vegetation types T and P as defined by Havel (1975a). This type occurs within the Dwellingup-Hester complex as defined by Heddle *et al.* (1980a). This site-vegetation type occurs on the mid to upper slopes of the undulating hills on the Darling Ranges. This combined type of types T and P is relatively restricted in distribution within the Northern Jarrah Forest and is poorly represented in the conservation estate (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987).

This site-vegetation type tends to be dominated by specific shrub species which dominate the sandy-gravelly slopes of the Darling Ranges (e.g. *Clematis pubescens*, *Allocasuarina fraseriana, Adenanthos barbiger, Pteridium esculentum, Leucopogon verticillatus, Bossiaea aquifolium* subsp. *aquifolium* and *Banksia grandis* of site-vegetation types P and T) but which lack some of the key indicators of the P type (e.g. *Grevillea wilsonii*) and includes species which occur on the gravelly soils (*Hovea chorizemifolia* and *Leucopogon verticillatus*).

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.

This type is a variant of site-vegetation types T and S as defined by Havel (1975a)). This type occurs within the Dwellingup and Dwellingup-Hester complexes as defined by Heddle *et al.* (1980a). This site-vegetation type occurs on the upper slopes, and to a lesser degree mid slopes, of the undulating hills on the Darling Ranges. This type is widespread in distribution within the Northern Jarrah Forest and is well represented in the conservation estate (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987).

This site-vegetation type tends to be dominated by specific shrub species which dominate the more fertile loam-gravelly slopes of the Darling Ranges (e.g. *Leucopogon verticillatus, Pteridium esculentum, Clematis pubescens, Hovea chorizemifolia* and *Bossiaea aquifolium* subsp. *aquifolium* but with some gravel influences).

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.

This type is equivalent to site-vegetation type T as defined by Havel (1975a)). This type occurs within the Helena, Murray, Dwellingup and Dwellingup-Hester complexes as defined by Heddle *et al.* (1980a).

This site-vegetation type occurs on the upper slopes, and to a lesser degree mid slopes, of the undulating hills on the Darling Ranges. This type is widespread in distribution within the Northern Jarrah Forest and is well represented in the conservation estate (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific shrub species which dominate the more fertile loams of the Darling Ranges (e.g. *Leucopogon verticillatus, Pteridium esculentum, Clematis pubescens, Hovea chorizemifolia* and *Bossiaea aquifolium* subsp*. aquifolium*).

R - Open Woodland of *Eucalyptus marginata - Corymbia calophylla* on fringes of granite outcrops or shallow soils.

This type is equivalent to the site-vegetation type R as defined by Havel 1975a) within the Cooke, Helena, Dwellingup and Dwellingup-Hester complexes as defined by Heddle *et al.* (1980a). This site-vegetation type occurs on the shallow soils surrounding outcrops on the upland and valley systems on the Darling Ranges. This type is restricted in distribution within the Northern Jarrah Forest, but is well represented in the conservation estate, e.g. the Monadnocks near Mt Cooke and Mt Windsor (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific shrub species which reflect the soils and moisture associated with outcrops on the Darling Ranges (e.g. *Trymalium ledifolium, Phyllanthus calycinus* and *Hypocalymma angustifolium*).

G1 - Open Heath of Proteaceae spp. – Myrtaceae spp. to Lithic Complex on exposed or shallow granite outcrops.

Variable structural formation depending on the degree of outcrop exposure. The vegetation can range from herbfields to open woodlands (site-vegetation type G as defined by Havel 1975b) within the Cooke, Helena, Dwellingup and Dwellingup-Hester complexes as defined by Heddle *et al.* (1980a).

This site-vegetation type occurs on the shallow soils on or surrounding outcrops on the upland and valley systems on the Darling Ranges. This type is restricted in distribution within the Northern Jarrah Forest, but is well represented in the conservation estate, e.g. the Monadnocks near Mt Cooke and Mt Windsor (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific herb and shrub species which reflect the soils and moisture associated with outcrops on the Darling Ranges.

G2 - Woodland of *Allocasuarina huegeliana* and associated herbs and low shrubs on shallow granite outcrops.

Variable structural formation depending on the degree of outcrop exposure. The vegetation can range from herbfields to open woodlands (site-vegetation type G as defined by Havel 1975b) within the Cooke, Helena, Dwellingup and Dwellingup-Hester complexes as defined by Heddle *et al.* (1980a).

This site-vegetation type occurs on the shallow soils on or surrounding outcrops on the upland and valley systems on the Darling Ranges. This type is restricted in distribution within the Northern Jarrah Forest, but is well represented in the eastern and northern conservation estates, e.g. the Monadnocks near Mt Cooke and Mt Windsor, Wandoo Woodlands (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987). This site-vegetation type tends to be dominated by specific herb and shrub species which reflect the soils and moisture associated with outcrops on the Darling Ranges.

CL - Cleared
DAM - Dam

5.5 Review of the Conservation Status of the Site-vegetation Types

None of these communities are listed at threatened ecological communities or priority ecological communities (Department of Environment and Conservation (2012c).

In reviewing these results the differences in local site conditions and the variety of plant species the following plant communities were highlighted:

. the occurrence of the R, G1 and G2 site-vegetation types reflecting localized granite outcrops,

. the occurrence of DG which reflected shallower soils on some of the lower valley slopes,

. the representation of the site-vegetation types PW and SW, which has positive implications for the management of the *Phytophthora cinnamomi* disease.

5.6 Review of Physiological Stress in the Survey Area

As discussed in the previous section, the areas of PW and SW have significant implications for the management of the *Phytophthora cinnamomi* infections in the area. In these areas there is a need to introduce hygiene measures in some areas as the mining and forestry activities will lead to changes in the local hydrological conditions and therefore the local site conditions.

In reviewing the degree of physiological stress in several of the main tree species, as summarized on the database as supplied to Alcoa of Australia Limited, it is important to take into account the number of recent deaths for *Banksia grandis* and *Eucalyptus marginata* during the design phase. In view of the recent deaths it is recommended that some testing is carried out for the presence of *Phytophthora cinnamomi;* although it is recognized that there are other causes of stress in plant species (e.g. competition, drought, age, fire, insect infestations (eg. borers) and other fungal diseases).

6. DISCUSSION

The survey effort builds on some thirty or so years of similar mapping in the region and therefore the information as provided reflects a substantial local knowledge of the northern Jarrah forest. Consequently the effort exceeds any needs that are required for government processing of the proposed mining activities.

A total of 590 vascular plant taxa from 70 plant families and 217 genera were recorded within the Myara survey area. Of these, thirty-five were introduced plant taxa. Dominant families include Fabaceae (86 taxa), Proteaceae (58 taxa), Myrtaceae (53 taxa), Asteraceae (32 taxa), Asparagaceae (29 taxa), Cyperaceae (25 taxa), Stylidiaceae (22 taxa), Ericaceae (22 taxa), Poaceae (19 taxa) and Dilleniaceace (18 taxa).

No Declared Threatened (Rare) Flora species gazetted under the *Wildlife Conservation Act* (1950-1980) were located on the Myara survey area. No endangered or vulnerable species, pursuant to s179 of the *Environment Protection and Biodiversity Conservation Act* (1999) were located during the survey.

Six Priority flora species were recorded within the Myara survey. This was increased to ten Priority flora species if the records from the Department of Environment and Conservation (2012a) are considered. The majority of the Priority species tend to occur on the granitic soils and near the fringes of the valleys which are not likely to be disturbed to any large extent by the proposed operations. In the more recent studies in the north-eastern section and along the western Darling Scarp, the extent of the granitic soils was more apparent near Mt Solus and the Darling Scarp.

A total of twenty-three site-vegetation types were defined and mapped for the Myara survey area and were representative of Havel's site-vegetation types for the Northern Jarrah Forest Region (Havel 1975a, 1975b).

The representation of the site-vegetation types were considered in a local and regional context. This assessment highlighted the following site-vegetation types:

- the occurrence of the R, G1 and G2 site-vegetation types reflecting localized granite outcrops and associated structural and floristic diversity,

- the integrity of the valley systems (AC, CW, D, E, W) should be maintained wherever possible to maximize the diversity of habitats for fauna species and plant species diversity, and

- the occurrence of DG which reflected shallower soils on some of the lower valley slopes,

- the representation of the site-vegetation types PW and SW, which has implications for the management of the *Phytophthora cinnamomi* disease.

As the mining will not directly impact the majority of the R, G1, G2 and DG types the main consideration for planning purposes appears to relate to the PW and SW types that reflect local soil moisture on mid and upper slopes.

7. LIST OF PARTICIPANTS

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APPENDIX A1: DEFINITION OF THREATENED AND PRIORITY FLORA SPECIES (Department of Environment and Conservation 2012b)

Conservation Code	Category
T	**Threatened Flora (Declared Rare Flora – Extant)** "Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedule 1 under the *Wildlife Conservation Act 1950*). Threatened Flora (Schedule 1) are further ranked by the Department according to their level of threat using IUCN Red List criteria: • **CR:** Critically Endangered – considered to be facing an extremely high risk of extinction in the wild • **EN:** Endangered – considered to be facing a very high risk of extinction in the wild • **VU:** Vulnerable – considered to be facing a high risk of extinction in the wild."
P1	**Priority One – Poorly Known Species** "Species that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes."
P2	**Priority Two – Poorly Known Species** "Species that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes."
P3	**Priority Three – Poorly Known Species** "Species that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them."
P4	**Priority Four – Rare 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. Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy."
P5	**Priority Five – Conservation Dependent Species** "Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years."

APPENDIX A2: DEFINITION OF THREATENED FLORA SPECIES (Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*)

Category Code	Category
Ex	**Extinct** Taxa 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** Taxa 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** Taxa 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** Taxa 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** Taxa 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** Taxa 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.

APPENDIX A3: DEFINITION OF THREATENED ECOLOGICAL COMMUNITIES (Department of Environment and Conservation 2012c)

Category Code	Category
PTD	**Presumed Totally Destroyed** An ecological community will be listed as Presumed Totally Destroyed if there are no recent records of the community being extant and either of the following applies: (i) records within the last 50 years have not been confirmed despite thorough searches or known likely habitats or; (ii) all occurrences recorded within the last 50 years have since been destroyed.
CE	**Critically Endangered** An ecological community will be listed as Critically Endangered 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 of the following criteria: (i) 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; (ii) The current distribution is limited ie. highly restricted, having very few small or isolated occurrences, or covering a small area; (iii) The ecological community is highly modified with potential of being rehabilitated in the immediate future.
E	**Endangered** An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. The ecological community must meet any one of the following criteria: (i) 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; (ii) The current distribution is limited ie. highly restricted, having very few small or isolated occurrences, or covering a small area; (iii) The ecological community is highly modified with potential of being rehabilitated in the short term future.
V	**Vulnerable** An ecological community will be listed as Vulnerable 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 of the following criteria: (i) The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated; (ii) The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution; (iii) The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.

APPENDIX A4: DEFINITION OF THREATENED ECOLOGICAL COMMUNITIES (Department of Sustainability, Environment, Water, Population and Communities 2012b)

Three categories exist for listing threatened ecological communities under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

Listing Category	Explanation of Category
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.

APPENDIX A5: DEFINITION OF PRIORITY ECOLOGICAL COMMUNITIES (Department of Environment and Conservation 2012c)

Category Code	Category
P1	**Poorly-known ecological communities** Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist.
P2	**Poorly-known ecological communities** Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, un-allocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.
P3	**Poorly known ecological communities** (i) 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 or: (ii) 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; (iii) 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	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.
P5	**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 A6: DEFINITION OF STANDARD CONTROL CODES FOR DECLARED PLANT SPECIES IN WESTERN AUSTRALIA (Department of Agriculture and Food 2012)

Control Code Requirement	Conditions
P1 Prohibits movement	The movement of plants or their seeds is prohibited within the State. This prohibits the movement of contaminated machinery and produce including livestock and fodder.
P2 Aim is to eradicate infestation	Treat all plants to destroy and prevent propagation each year until no plants remain. The infested area must be managed in such a way that prevents the spread of seed or plant parts on or in livestock, fodder, grain, vehicles and/or machinery.
P3 Aims to control infestation by reducing area and/or density of infestation	The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set all plants:- • within 100 metres inside of the boundaries of the infestation • within 50 metres of roads and highwater mark on waterways • within 50 metres of sheds, stock yards and houses Treatment must be done prior to seed set each year. Of the remaining infested area:- Where plant density is 1-10 per hectare treat 100% of infestation. Where plant density is 11-100 per hectare treat 50% of infestation. Where plant density is 101-1000 per hectare treat 10% of infestation. Properties with less than 2 hectares of infestation must treat the entire infestation. Additional areas may be ordered to be treated.
P4 Aims to prevent infestation spreading beyond existing boundaries of infestation.	The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set all plants:- • within 100 metres inside of the boundaries of the infested property • within 50 metres of roads and highwater mark on waterways • within 50 metres of sheds, stock yards and houses Treatment must be done prior to seed set each year. Properties with less than 2 hectares of infestation must treat the entire infestation. Additional areas may be ordered to be treated.
Special considerations	In the case of P4 infestations where they continue across property boundaries there is no requirement to treat the relevant part of the property boundaries as long as the boundaries of the infestation as a whole are treated. There must be agreement between neighbours in relation to the treatment of these areas.

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN MYARA, 2008-2012

			Assessment Date			
Family		**Species**	**2008**	**2009**	**2010**	**2012**
PTERIDACEAE		*Adiantum aethiopicum*		x		
		Cheilanthes austrotenuifolia	x			x
		Cheilanthes sieberi subsp. *sieberi*				x
CYATHEACEAE	PL	*Cyathea cooperi*	x			
DENNSTAEDTIACEAE		*Pteridium esculentum*	x	x	x	x
LINDSAEACEAE		*Lindsaea linearis*	x	x		x
ZAMIACEAE		*Macrozamia riedlei*	x	x	x	x
PODOCARPACEAE		*Podocarpus drouynianus*				x
PINACEAE	*	*Pinus pinaster*	x			
	*	*Pinus radiata*	x			
TYPHACEAE		*Typha* sp.				x
POACEAE	*	*Aira caryophyllea*		x	x	x
	*	*Aira cupaniana*		x		
		Amphipogon amphipogonoides	x	x	x	x
		Amphipogon laguroides subsp. *laguroides*				x
		Amphipogon turbinatus			x	
		Amphipogon sp.		x		
		Austrostipa flavescens		x		
		Austrostipa sp.		x		
	*	*Briza maxima*				x
		Dichelachne crinita		x		
	*	*Ehrharta* sp.	x			
		Neurachne alopecuroidea	x	x	x	x
		Rytidosperma acerosum	x			
		Rytidosperma caespitosum	x	x	x	x
		Rytidosperma occidentale				x
		Rytidosperma sp.	x	x	x	
		Spartochloa scirpoidea				x
		Tetrarrhena laevis	x	x	x	x
		Poaceae sp.	x	x	x	x
CYPERACEAE		*Baumea articulata*				x
		Baumea vaginalis		x		
		Cyathochaeta avenacea	x	x	x	x
		Cyathochaeta teretifolia (P3)	x			
		Gahnia decomposita	x	x	x	x
		Gahnia trifida	x			
	*	*Isolepis marginata*		x		
		Lepidosperma costale				x
		Lepidosperma drummondii	x			
		Lepidosperma effusum				x
		Lepidosperma gracile		x	x	x
		Lepidosperma leptostachyum	x	x	x	x

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN MYARA, 2008-2012

		Assessment Date			
Family	**Species**	**2008**	**2009**	**2010**	**2012**
CYPERACEAE	*Lepidosperma pubisquameum*	x	x		x
(continued)	*Lepidosperma squamatum*	x	x	x	x
	Lepidosperma striatum	x			
	Lepidosperma tenue	x	x	x	x
	Lepidosperma tetraquetrum	x	x	x	x
	Lepidosperma tuberculatum	x			x
	Lepidosperma sp.	x	x	x	x
	Mesomelaena graciliceps	x			
	Mesomelaena tetragona	x	x		x
	Schoenus clandestinus	x			
	Schoenus sp.			x	
	Tetraria capillaris	x	x	x	x
	Tetraria octandra	x	x	x	x
RESTIONACEAE	*Alexgeorgea nitens*	x	x		
	Desmocladus fasciculatus	x	x	x	x
	Desmocladus flexuosus	x	x	x	x
	Hypolaena exsulca	x	x		x
	Loxocarya cinerea	x	x	x	x
	Loxocarya striata				x
	Meeboldina coangustata		x		
	Meeboldina scariosa		x	x	
	Sporadanthus rivularis (ms)	x	x	x	
	Restionaceae sp.		x	x	
ANARTHRIACEAE	*Lyginia barbata*	x	x	x	x
PHILYDRACEAE	*Philydrella drummondii*		x		
JUNCAEAE	*Juncus* sp.				x
ASPARAGACEAE	*Chamaescilla corymbosa*	x	x		x
	Chamaescilla corymbosa var. *corymbosa*		x		
	Laxmannia squarrosa	x	x		x
	Lomandra brittanii	x	x	x	x
	Lomandra caespitosa	x	x	x	x
	Lomandra drummondii	x	x	x	x
	Lomandra hermaphrodita	x	x	x	x
	Lomandra integra	x	x		
	Lomandra micrantha	x	x	x	
	Lomandra micrantha subsp. *micrantha*	x	x		x
	Lomandra nigricans	x			x
	Lomandra odora	x			
	Lomandra pauciflora			x	
	Lomandra preissii	x	x		x
	Lomandra purpurea	x	x		x
	Lomandra sericea	x	x	x	x
	Lomandra sonderi	x	x	x	x
	Lomandra spartea	x	x	x	x
	Lomandra sp.	x	x	x	x
	Thysanotus dichotomus	x	x	x	x
	Thysanotus fastigiatus	x	x	x	x

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN MYARA, 2008-2012

		Assessment Date			
Family	**Species**	**2008**	**2009**	**2010**	**2012**
ASPARAGACEAE	*Thysanotus manglesianus*	x	x		x
(continued)	*Thysanotus multiflorus*	x	x	x	x
	Thysanotus sparteus			x	x
	Thysanotus tenellus	x	x		
	Thysanotus thyrsoideus	x	x		
	Thysanotus thyrsoideus (white flower form)	x			
	Thysanotus triandrus	x			x
	Thysanotus sp.	x	x	x	x
DASYPOGONACEAE	*Dasypogon bromeliifolius*		x		
	Kingia australis	x			x
XANTHORRHOEACEAE	*Xanthorrhoea gracilis*	x	x	x	x
	Xanthorrhoea preissii	x	x	x	x
COLCHICACEAE	*Burchardia congesta*	x	x		x
	Borya scirpoidea				x
BORYACEAE	*Borya sphaerocephala*	x			x
HEMEROCALLIDACEAE	*Agrostocrinum hirsutum*	x	x	x	x
	Agrostocrinum sp.		x		
	Caesia sp.	x			
	Corynotheca micrantha	x			x
	Dianella revoluta	x	x	x	x
	Dianella revoluta var. *divaricata*	x			x
	Johnsonia lupulina	x			
	Stypandra glauca				x
	Tricoryne elatior	x	x	x	
	Tricoryne humilis	x	x		x
HAEMODORACEAE	*Anigozanthos ?manglesii*	x			
	Anigozanthos **sp.**		x		
	Conostylis aculeata subsp. *aculeata*	x	x		
	Conostylis pusilla		x		x
	Conostylis serrulata	x	x	x	x
	Conostylis setigera	x	x	x	x
	Conostylis setosa	x	x	x	x
	Conostylis sp.	x	x		
	Haemodorum discolor	x	x		
	Haemodorum sp.	x	x	x	x
	Phlebocarya ciliata				x
	Haemodoraceae sp.		x	x	
HYPOXIDACEAE	*Hypoxis gardneri*	x			
IRIDACEAE	*Patersonia babianoides*	x	x	x	x
	Patersonia occidentalis	x	x	x	x
	Patersonia pygmaea	x	x	x	x
	Patersonia rudis	x	x	x	x
	Patersonia rudis subsp. *rudis*	x			x

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN MYARA, 2008-2012

		Assessment Date			
Family	**Species**	**2008**	**2009**	**2010**	**2012**
IRIDACEAE	*Patersonia umbrosa*				x
(continued)	*Patersonia* sp.				x
ORCHIDACEAE	*Caladenia flava subsp. flava*	x			
	Caladenia latifolia	x			
	Caladenia sp.	x	x	x	x
	Cyrtostylis sp.				x
	Diuris sp.	x			
	Drakaea sp.	x			
	Elythranthera brunonis	x	x		
	Pterostylis barbata	x			
	Pterostylis recurva	x			
	Pterostylis sanguinea	x			
	Pterostylis vittata	x			
	Pterostylis sp.	x	x		x
	Pyrorchis nigricans	x			
	Pyrorchis sp.		x		x
	Thelymitra macrophylla		x		
	Thelymitra ***sp.***	x	x		x
	Orchidaceae sp.	x	x	x	x
CASUARINACEAE	*Allocasuarina fraseriana*	x	x	x	x
	Allocasuarina huegeliana				x
	Allocasuarina humilis	x	x	x	x
	Allocasuarina sp.				x
PROTEACEAE	*Adenanthos barbiger*	x	x	x	x
	Adenanthos obovatus	x	x	x	
	Banksia armata var. *armata*	x			x
	Banksia bipinnatifida subsp. *bipinnatifida*	x			x
	Banksia dallanneyi var. *dallanneyi*	x	x	x	x
	Banksia dallanneyi subsp. *sylvestris*	x			x
	Banksia grandis	x	x	x	x
	Banksia littoralis	x	x	x	x
	Banksia seminuda	x	x		
	Banksia sessilis	x	x	x	x
	Banksia sessilis var. *sessilis*		x		
	Banksia sphaerocarpa				x
	Banksia squarrosa subsp. *squarrosa*	x	x	x	x
	Banksia undata				x
	Conospermum capitatum	x	x		x
	Conospermum capitatum subsp. *glabratum*	x			x
	Grevillea bipinnatifida	x		x	
	Grevillea bipinnatifida subsp. *bipinnatifida*	x			x
	Grevillea centristigma	x			
	Grevillea diversifolia			x	
	Grevillea diversifolia subsp. *diversifolia*	x	x		x
	Grevillea manglesii subsp. *manglesii*				x
	Grevillea pilulifera	x			
	Grevillea preissii				x
	Grevillea pulchella	x		x	x
	Grevillea pulchella subsp. ascendens	x			x

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN MYARA, 2008-2012

		Assessment Date			
Family	**Species**	**2008**	**2009**	**2010**	**2012**
PROTEACEAE	*Grevillea quercifolia*		x		x
(continued)	*Grevillea ?trifida*			x	
	Grevillea wilsonii	x	x	x	x
	Hakea amplexicaulis	x	x	x	x
	Hakea cyclocarpa		x		x
	Hakea erinacea				x
	Hakea incrassata	x		x	x
	Hakea lissocarpha	x	x	x	x
	Hakea marginata	x			
	Hakea petiolaris subsp. *petiolaris*				x
	Hakea prostrata		x	x	x
	Hakea ruscifolia	x	x	x	x
	Hakea stenocarpa	x	x		x
	Hakea trifurcata	x	x		x
	Hakea undulata	x	x	x	x
	Hakea varia		x	x	x
	Isopogon dubius	x			x
	Isopogon sphaerocephalus	x			x
	Isopogon sp. Darling Range (F. Hort 1662)				x
	Persoonia elliptica	x	x	x	x
	Persoonia longifolia	x	x	x	x
	Petrophile biloba	x			x
	Petrophile heterophylla		x		
	Petrophile linearis	x			x
	Petrophile serruriae	x			x
	Petrophile striata	x			x
	Stirlingia latifolia				x
	Synaphea ?damopsis				x
	Synaphea gracillima	x			x
	Synaphea petiolaris subsp. *petiolaris*		x		x
	Synaphea spinulosa	x			
	Xylomelum occidentale	x	x		x
SANTALACEAE	*Exocarpos sparteus*				x
	Leptomeria cunninghamii	x	x	x	x
OLACACEAE	*Olax benthamiana*	x		x	x
LORANTHACEAE	*Amyema* sp.				x
	Nuytsia floribunda	x	x		
AMARANTHACEAE	*Ptilotus drummondii*				x
	Ptilotus manglesii	x	x		x
	Ptilotus sp.				x
PHYTOLACCACEAE *	*Phytolacca octandra*				x
RANUNCULACEAE	*Clematis pubescens*	x	x	x	x
	Ranunculus colonorum	x	x		

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN MYARA, 2008-2012

			Assessment Date			
Family		**Species**	**2008**	**2009**	**2010**	**2012**
LAURACEAE		*Cassytha glabella*			x	
		Cassytha glabella forma *glabella*		x		
		Cassytha pomiformis				x
		Cassytha racemosa	x		x	
		Cassytha racemosa forma *pilosa*		x		
		Cassytha racemosa forma *racemosa*	x	x		
		Cassytha sp.		x	x	x
BRASSICACEAE	*	*Brassica tournefortii*		x		
DROSERACEAE		*Drosera erythrorhiza*	x			x
		Drosera gigantea		x		x
		Drosera gigantea subsp. *gigantea*		x		
		Drosera hyperostigma		x		
		Drosera macrantha				x
		Drosera menziesii				x
		Drosera pallida	x	x		
		Drosera platystigma		x		x
		Drosera silvicola				x
		Drosera stolonifera	x			
		Drosera sp.	x	x	x	x
		Drosera sp. (climbing)	x			
PITTOSPORACEAE		*Billardiera floribunda*	x	x	x	x
		Billardiera fraseri	x			
		Billardiera fusiformis	x	x	x	x
		Billardiera heterophylla	x		x	
		Billardiera variifolia		x	x	x
		Billardiera sp.			x	x
		Marianthus coeruleopunctatus	x			
		Marianthus drummondianus	x	x	x	x
		Marianthus tenuis				x
FABACEAE		*Acacia alata*	x	x	x	
		Acacia alata var. *alata*	x	x		x
		Acacia applanata				x
		Acacia barbinervis	x	x		
		Acacia barbinervis subsp. *barbinervis*	x	x		
		Acacia browniana	x	x	x	x
		Acacia browniana var. *endlicheri*				x
		Acacia celastrifolia	x	x		x
		Acacia dentifera	x		x	x
		Acacia divergens	x	x	x	x
		Acacia drummondii	x			
		Acacia drummondii subsp. *affinis* (P3)	x	x		
		Acacia drummondii subsp. *candolleana*	x	x		x
		Acacia drummondii subsp. *drummondii*	x			x
		Acacia ephedroides	x			x
		Acacia extensa	x	x	x	x
		Acacia lateriticola	x	x	x	x
	*	*Acacia longifolia*	x			
		Acacia multispicata	x			x

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN MYARA, 2008-2012

		Assessment Date			
Family	**Species**	**2008**	**2009**	**2010**	**2012**
FABACEAE	*Acacia nervosa*	x	x	x	x
(continued)	*Acacia obovata*	x			x
	* *Acacia podalyriifolia*	x			
	Acacia preissiana	x	x	x	x
	Acacia pulchella	x	x	x	x
	Acacia pulchella var. *glaberrima*	x		x	
	Acacia ? sulcata var. *platyphylla*				x
	Acacia urophylla	x	x	x	x
	Acacia varia	x			x
	Acacia varia var. varia	x			
	Acacia willdenowiana	x	x	x	x
	Acacia sp.	x	x	x	
	Acacia stenoptera				x
	Aotus cordifolia	x			
	Bossiaea aquifolium	x	x	x	x
	Bossiaea aquifolium subsp. *aquifolium*	x			
	Bossiaea eriocarpa	x			x
	Bossiaea ornata	x	x	x	x
	Bossiaea sp.	x			
	Callistachys lanceolata		x	x	x
	Chorizema cordatum	x	x		x
	Chorizema dicksonii	x			
	Chorizema rhombeum	x	x		
	Daviesia cordata		x		
	Daviesia decurrens	x	x	x	x
	Daviesia divaricata	x			
	Daviesia horrida	x		x	x
	Daviesia incrassata	x	x	x	x
	Daviesia longifolia				x
	Daviesia physodes		x		x
	Daviesia preissii	x	x		x
	Daviesia rhombifolia		x		x
	Daviesia sp.			x	
	Dillwynia sp.		x		
	Eutaxia virgata				x
	Gastrolobium bilobum				x
	Gastrolobium calycinum				x
	Gastrolobium ebracteolatum		x	x	
	Gastrolobium spinosum	x			x
	Gastrolobium villosum				x
	Gompholobium cyaninum	x			x
	Gompholobium knightianum	x	x	x	x
	Gompholobium marginatum	x	x	x	x
	Gompholobium polymorphum	x	x	x	x
	Gompholobium preissii	x	x		x
	Gompholobium tomentosum	x			x
	Gompholobium sp.	x			
	Hardenbergia comptoniana	x		x	x
	Hovea chorizemifolia	x	x	x	x
	Hovea trisperma	x	x	x	x
	Jacksonia alata		x		
	Jacksonia furcellata		x		

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN MYARA, 2008-2012

		Assessment Date			
Family	**Species**	**2008**	**2009**	**2010**	**2012**
FABACEAE	*Kennedia carinata*	x			
(continued)	*Kennedia coccinea*	x	x	x	x
	Kennedia prostrata	x	x		x
	Labichea punctata	x	x		x
	Mirbelia dilatata	x	x	x	x
	Paraserianthes lophantha		x	x	
	Paraserianthes lophantha subsp. *lophantha*	x	x		x
	Robinia pseudoacacia				x
	Sphaerolobium linophyllum		x		
	Sphaerolobium medium	x	x	x	x
	Sphaerolobium vimineum		x		
	PL *Tipuana tipu*	x			
	* *Trifolium repens*	x			
	* *Trifolium* sp.				x
	Viminaria juncea		x	x	x
OXALIDACEAE	* Oxalis pes-caprae				x
	* Oxalis sp.				x
RUTACEAE	*Asterolasia pallida* subsp. *pallida*	x			x
	Boronia crenulata	x	x	x	x
	*Boronia crenulata ?*var*. crenulata*	x		x	
	Boronia crenulata subsp. *viminea*	x	x	x	x
	Boronia fastigiata	x	x	x	x
	Boronia molloyae	x	x	x	x
	Boronia spathulata		x		
	Boronia sp.		x		
	Diplolaena microcephala				x
	Philotheca spicata	x	x	x	x
POLYGALACEAE	*Comesperma calymega*	x	x	x	x
	Comesperma ciliatum	x	x		
	Comesperma confertum				x
	Comesperma ?polygaloides		x		
	Comesperma virgatum	x	x	x	x
EUPHORBIACEAE	*Amperea simulans*	x	x		
	Monotaxis grandiflora		x		
	Monotaxis occidentalis	x	x		x
	Stachystemon vermicularis				x
PHYLLANTHACEAE	*Phyllanthus calycinus*	x	x	x	x
	Poranthera microphylla		x		
CELASTRACEAE	*Stackhousia monogyna*	x	x		x
	Tripterococcus brunonis	x	x		x
SAPINDACEAE	*Dodonaea ceratocarpa*	x			x
	Dodonaea viscosa subsp. *angustissima*				x

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN MYARA, 2008-2012

			Assessment Date			
Family		**Species**	**2008**	**2009**	**2010**	**2012**
RHAMNACEAE		*Cryptandra arbutiflora* var. *arbutiflora*				x
		Trymalium ledifolium	x	x	x	x
		Trymalium ledifolium var. *rosmarinifolium*	x			
		Trymalium odoratissimum		x		
		Trymalium odoratissimum subsp. *odoratissimum*	x	x	x	x
ELAEOCARPACEAE		*Platytheca galioides*	x			
		Tetratheca hirsuta	x	x	x	x
		Tetratheca hispidissima			x	x
		Tetratheca setigera		x		
		Tremandra diffusa	x			x
MALVACEAE		*Lasiopetalum floribundum*	x	x	x	x
		Lasiopetalum glabratum		x	x	x
		Thomasia paniculata	x	x	x	x
DILLENIACEAE		*Hibbertia acerosa*	x	x	x	x
		Hibbertia amplexicaulis	x	x	x	x
		Hibbertia commutata	x	x	x	x
		Hibbertia commutata (glabrous form)	x			
		Hibbertia commutata (hairy form)	x	x		
		Hibbertia diamesogenos		x		x
		Hibbertia glomerata subsp. *glomerata*	x			
		Hibbertia huegelii	x	x		x
		Hibbertia hypericoides	x	x	x	x
		Hibbertia lasiopus	x	x	x	x
		Hibbertia ovata	x	x	x	x
		Hibbertia pachyrrhiza	x	x		x
		Hibbertia perfoliata	x	x		x
		Hibbertia pilosa		x		
		Hibbertia quadricolor	x			
		Hibbertia silvestris	x			x
		Hibbertia subvaginata	x			
		Hibbertia vaginata		x		
HYPERICACEAE	*	*Hypericum perforatum*			x	
VIOLACEAE		*Hybanthus calycinus*		x		
		Hybanthus debilissimus	x	x	x	
		Hybanthus floribundus subsp. *floribundus*			x	x
THYMELAEACEAE		*Pimelea ciliata*	x	x	x	
		Pimelea ciliata subsp. *ciliata*		x		x
		Pimelea imbricata var. *piligera*	x			
		Pimelea lanata	x	x		
		Pimelea lehmanniana subsp. *nervosa*				x
		Pimelea ?preissii				
		Pimelea spectabilis	x	x		
		Pimelea suaveolens	x	x	x	
		Pimelea suaveolens subsp. *suaveolens*	x	x		x
		Pimelea sp.	x	x		

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN MYARA, 2008-2012

		Assessment Date			
Family	**Species**	**2008**	**2009**	**2010**	**2012**
MYRTACEAE	*Agonis flexuosa*		x		
	Astartea leptophylla				x
	Astartea scoparia	x	x	x	x
	Babingtonia camphorosmae	x	x	x	x
	Beaufortia macrostemon				x
	Callistemon glaucus		x		
	Calothamnus quadrifidus	x	x		
	Calothamnus rupestris (P4)	x	x		
	Calothamnus sp.				x
	Calytrix depressa	x			x
	Calytrix flavescens			x	
	Corymbia calophylla	x	x	x	x
	Darwinia citriodora	x	x		x
	Darwinia thymoides subsp. *thymoides*	x			
	Eucalyptus drummondii	x			x
PL	*Eucalyptus maculata*	x			
	Eucalyptus marginata	x	x	x	x
	Eucalyptus megacarpa	x	x	x	x
PL	*Eucalyptus microcorys*	x			
	Eucalyptus patens	x	x	x	x
	Eucalyptus rudis		x	x	x
	Eucalyptus rudis subsp. *rudis*			x	
	Eucayptus wandoo		x		
	Hypocalymma angustifolium	x	x	x	x
	Hypocalymma cordifolium	x	x	x	
	Hypocalymma cordifolium subsp. *cordifolium*		x		x
	Hypocalymma robustum	x	x	x	x
	Kunzea ericifolia	x	x		
	Kunzea glabrescens			x	x
	Kunzea ?recurva	x			
	Leptospermum erubescens	x	x		x
*	*Leptospermum laevigatum*	x			
	Melaleuca incana subsp. *incana*	x	x		x
	Melaleuca lateritia		x		x
	Melaleuca parviceps	x	x		x
	Melaleuca pauciflora	x	x		
	Melaleuca preissiana	x	x	x	x
	Melaleuca rhaphiophylla		x	x	
	Melaleuca viminea	x	x	x	x
	Melaleuca trichophylla				x
	Melaleuca sp.	x			
	Pericalymma ellipticum	x	x	x	x
	Pericalymma ellipticum var. ellipticum	x			
	Pericalymma ellipticum var. floridum	x			
	Taxandria linearifolia	x	x	x	x
	Verticordia densiflora var. *densiflora*				x
	Verticordia huegelii var. huegelii		x		x
	Verticordia plumosa				x
	Verticordia plumosa var. *brachyphylla*				x
	Verticordia pennigera	x			x
	Verticordia plumosa var. plumosa	x	x	x	x

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		Assessment Date			
Family	**Species**	**2008**	**2009**	**2010**	**2012**
MYRTACEAE	*Verticordia* sp.				x
(continued)	Myrtaceae sp.			x	
HALORAGACEAE	*Glischrocaryon angustifolium*		x		
	Glischrocaryon aureum				x
	Gonocarpus benthamii	x	x	x	
	Gonocarpus benthamii subsp. *benthamii* (ms)	x	x		
	Gonocarpus cordiger	x			
	Gonocarpus diffusus		x		
	? Gonocarpus sp.				x
ARALIACEAE	*Trachymene pilosa*	x	x		x
APIACEAE	*Apium prostratum*		x		x
	Daucus glochidiatus	x			
	Pentapeltis peltigera	x	x	x	x
	Platysace compressa	x	x		x
	Platysace filiformis	x	x	x	x
	Platysace tenuissima	x	x	x	x
	Platysace sp.	x			
	Xanthosia atkinsoniana	x	x	x	x
	Xanthosia candida	x	x	x	x
	Xanthosia fruticulosa	x			
	Xanthosia huegelii	x	x	x	x
	Xanthosia singuliflora	x			x
	Apiaceae sp.		x		
ERICACEAE	*Andersonia aristata*				x
	Andersonia lehmanniana				x
	Andersonia lehmanniana subsp. *lehmanniana*	x			x
	Andersonia sp.	x			x
	Astroloma ciliatum	x	x	x	x
	Astroloma pallidum	x	x	x	x
	Astroloma sp.				x
	Conostephium pendulum		x		
	Leucopogon australis		x		
	Leucopogon capitellatus	x	x	x	x
	Leucopogon glabellus	x	x		x
	Leucopogon gracillimus	x			
	Leucopogon hirsutus		x		
	Leucopogon nutans	x	x	x	x
	Leucopogon oxycedrus	x			
	Leucopogon propinquus	x	x	x	x
	Leucopogon pulchellus	x	x	x	x
	Leucopogon strictus				x
	Leucopogon verticillatus	x	x	x	x
	Leucopogon sp.	x			x
	Styphelia tenuiflora	x	x	x	x
	Ericaceae sp.	x			

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN MYARA, 2008-2012

			Assessment Date			
Family		**Species**	**2008**	**2009**	**2010**	**2012**
PRIMULACEAE	*	*Lysimachia arvensis*	x	x		x
		Logania campanulata				x
		Samolus junceus				x
LOGANIACEAE		*Logania serpyllifolia*	x		x	x
		Logania serpyllifolia subsp. *angustifolia*	x			
		Logania serpyllifolia subsp. *serpyllifolia*			x	
		Phyllangium paradoxum	x	x		
GENTIANACEAE	*	*Centaurium erythraea*	x		x	x
MENYANTHACEAE		*Ornduffia parnassifolia*		x		
LAMIACEAE		*Hemiandra pungens*	x			x
		Hemigenia incana	x			x
		Hemigenia pritzelii	x	x	x	x
		Hemiphora bartlingii				x
SCROPHULARIACEAE	*	*Verbascum virgatum*				x
OROBANCHACEAE	*	*Orobanche minor*	x			
LENTIBULARIACEAE		*Utricularia multifida*		x		
RUBIACEAE		*Opercularia apiciflora*	x	x		
		Opercularia echinocephala	x	x	x	x
		Opercularia hispidula	x	x	x	x
		Opercularia vaginata	x			x
		Opercularia sp.	x			
CAMPANULACEAE		*Isotoma hypocrateriformis*	x	x		x
		Lobelia gibbosa			x	x
		Lobelia heterophylla		x		
		Lobelia rhombifolia	x	x		
GOODENIACEAE		*Dampiera alata*	x	x		
		Dampiera hederacea	x	x		x
		Dampiera linearis	x	x	x	x
		Lechenaultia biloba	x	x	x	x
		Lechenaultia formosa	x			
		Scaevola calliptera	x	x	x	x
		Scaevola pilosa				x
STYLIDIACEAE		*Levenhookia preissii*	x			
		Levenhookia pusilla	x	x	x	x
		Levenhookia stipitata	x			x
		Stylidium amoenum	x	x	x	x
		Stylidium androsaceum		x		
		Stylidium brunonianum	x	x		x
		Stylidium bulbiferum	x	x	x	x
		Stylidium calcaratum	x	x		
		Stylidium ciliatum				x

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			Assessment Date			
Family		**Species**	**2008**	**2009**	**2010**	**2012**
STYLIDIACEAE		*Stylidium crassifolium*		x		
(continued)		*Stylidium dichotomum*	x		x	
		Stylidium diuroides subsp. *diuroides*				x
		Stylidium ireneae (P4)		x		
		Stylidium junceum	x	x		x
		Stylidium lateriticola				x
		Stylidium lineatum		x		
		Stylidium longitubum (P3)		x		
		Stylidium piliferum	x	x	x	x
		Stylidium pycnostachyum	x			
		Stylidium repens	x	x		x
		Stylidium schoenoides	x			
		Stylidium sp.	x	x	x	
ASTERACEAE	*	*Arctotheca calendula*		x		
		Brachyscome iberidifolia			x	
	*	*Cotula turbinata*	x			
		Craspedia variabilis	x	x		x
		Helichrysum luteoalbum	x			
		Hyalosperma cotula	x	x	x	x
	*	*Hypochaeris glabra*	x	x	x	x
	*	*Hypochaeris radicata*	x			x
	*	*Hypochaeris* sp.				x
		Lagenophora huegelii	x	x	x	x
		Millotia tenuifolia var. *tenuifolia*	x			
		Olearia paucidentata	x			
		Podolepis gracilis	x	x	x	
		Podolepis lessonii			x	
		Podotheca gnaphalioides		x		
		Pterochaeta paniculata	x	x	x	x
		Pterochaeta sp.	x			
		Rhodanthe citrina	x	x		
	*	*Senecio diaschides*	x	x		x
		Senecio hispidulus	x	x	x	x
		Senecio hispidulus var. *hispidulus*	x	x	x	
		Senecio leucoglossus (P4)	x	x	x	x
		Senecio pinnatifolius		x		
		Senecio quadridentatus	x	x	x	x
	*	*Senecio vulgaris*	x	x	x	x
		Senecio sp.	x	x	x	x
		Siloxerus humifusus	x	x	x	
	*	*Sonchus oleraceus*			x	
		Trichocline spathulata	x	x	x	x
	*	*Ursinia anthemoides*	x	x		
		Waitzia suaveolens var. suaveolens			x	x
	*	Asteraceae sp.		x	x	

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES BY SITE-VEGETATION TYPE, MYARA

	Site-Vegetation Types																					
Species	**AC**	**AD**	**CW**	**W**	**Q**	**D**	**DG**	**E**	**P**	**PW**	**PG**	**PT**	**PS**	**SP**	**S**	**SW**	**ST**	**TP**	**TS**	**T**	**R**	**G1**	**G2**
Acacia alata	x		x	x		x	x					x	x	x	x	x				x			
Acacia alata var. *alata*	x		x	x		x	x	x	x	x			x	x	x	x	x		x		x	x	
Acacia applanata			x						x				x	x	x								
Acacia barbinervis	x	x				x	x						x		x	x							
Acacia barbinervis subsp. *barbinervis*	x			x									x		x								
Acacia browniana	x		x	x		x	x		x	x		x	x	x	x	x	x	x	x	x	x	x	
Acacia browniana var. *endlicheri*														x			x						
Acacia celastrifolia			x										x		x		x					x	
Acacia dentifera			x											x	x						x	x	
Acacia divergens	x		x	x									x	x		x							
Acacia drummondii						x				x		x			x								
Acacia drummondii subsp. *affinis* (P3)															x		x						
Acacia drummondii subsp. *candolleana*	x		x	x		x		x	x	x			x	x	x	x	x		x		x	x	
Acacia drummondii subsp. *drummondii*										x		x	x		x		x					x	
Acacia ephedroides							x								x							x	x
Acacia extensa			x	x		x	x		x	x			x	x	x	x	x	x	x	x	x	x	
Acacia lateriticola	x		x	x		x	x		x	x		x	x	x	x	x	x	x	x	x	x	x	
* *Acacia longifolia*	x		x			x																	
Acacia multispicata																						x	
Acacia nervosa						x	x			x			x	x	x								
Acacia obovata		x	x			x			x	x		x	x	x		x						x	
* *Acacia podalyriifolia*	x		x			x																	
Acacia preissiana	x			x		x	x		x	x		x	x	x	x	x				x			
Acacia pulchella	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Acacia pulchella var. *glaberrima*															x								
Acacia sp.	x			x											x		x			x			
Acacia stenoptera										x					x								
Acacia ?sulcata var. *platyphylla*																						x	
Acacia urophylla			x	x		x	x		x	x		x	x	x	x	x	x	x	x	x	x	x	
Acacia varia												x	x		x								
Acacia willdenowiana	x		x			x		x		x			x	x	x	x	x		x	x	x		
Adenanthos barbiger	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Adenanthos obovatus															x					x			
Agonis flexuosa															x								
Agrostocrinum hirsutum			x	x		x	x			x		x	x	x	x		x	x	x	x			
Agrostocrinum sp.														x	x								
* *Aira caryophyllea*				x											x	x	x					x	
* *Aira cupaniana*				x									x										
Alexgeorgea nitens												x	x	x	x					x			
Allocasuarina fraseriana	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES BY SITE-VEGETATION TYPE, MYARA

Species	Site-Vegetation Types																					
	AC	AD	CW	W	Q	D	DG	E	P	PW	PG	PT	PS	SP	S	SW	ST	TP	TS	T	R	G1	G2
Allocasuarina huegeliana																						x	x
Allocasuarina humilis		x						x				x	x	x	x							x	
Allocasuarina sp.										x					x								
Amperea simulans													x										
Amphipogon amphipogonoides						x						x	x	x	x		x		x	x		x	
Amphipogon laguroides subsp. *laguroides*								x															
Amphipogon sp.															x								
Amphipogon turbinatus															x					x			
Amyema sp.								x															
* *Lysimachia arvensis*					x											x							
Andersonia aristata																						x	x
Andersonia lehmanniana																						x	
Andersonia lehmanniana subsp. *lehmanniana*																						x	
Andersonia sp.														x									
Aotus cordifolia	x		x																				
Apiaceae sp.															x								
Apium prostratum				x	x										x		x		x	x	x		
* *Arctotheca calendula*															x								
Astartea leptophylla	x																						
Astartea scoparia	x	x	x	x	x	x				x		x	x	x	x	x					x	x	x
* Asteraceae sp.	x		x	x		x				x		x								x			
Asterolasia pallida subsp. *pallida*			x	x		x		x	x	x		x	x	x	x	x	x		x			x	
Astroloma ciliatum	x			x		x	x		x	x		x	x	x	x	x	x			x	x	x	
Astroloma pallidum		x	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
Astroloma sp.															x		x						
Rytidosperma caespitosum			x	x						x		x	x	x	x	x	x		x	x	x	x	
Rytidosperma occidentalis															x		x						
Rytidosperma sp.				x											x		x						
Austrostipa flavescens																x							
Austrostipa sp.																				x			
Babingtonia camphorosmae	x	x	x	x		x	x	x	x	x		x	x	x	x	x					x	x	x
Banksia armata var. *armata*																					x	x	
Banksia bipinnatifida subsp. *bipinnatifida*										x					x						x	x	
Banksia ?seminuda			x																				
Banksia dallanneyi var. *dallanneyi*	x	x	x	x		x	x			x	x	x	x	x	x	x	x	x	x	x		x	
Banksia dallanneyi subsp. *sylvestris*			x			x			x	x	x	x	x	x	x	x	x			x	x		
Banksia grandis	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Banksia littoralis	x	x	x	x		x	x	x		x						x				x	x		
Banksia seminuda			x																				
Banksia sessilis	x		x	x		x	x			x		x	x	x	x	x				x			

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	Site-Vegetation Types																						
Species	**AC**	**AD**	**CW**	**W**	**Q**	**D**	**DG**	**E**	**P**	**PW**	**PG**	**PT**	**PS**	**SP**	**S**	**SW**	**ST**	**TP**	**TS**	**T**	**R**	**G1**	**G2**
Banksia sessilis var. *sessilis*												x											
Banksia sphaerocarpa var. *sphaerocarpa*						x		x	x	x	x		x	x	x	x					x	x	
Banksia squarrosa subsp. *squarrosa*	x		x			x	x					x	x		x						x		
Banksia undata														x		x						x	x
Baumea articulata	x																						
Baumea vaginalis			x																				
Beaufortia macrostemon						x			x				x								x	x	
Billardiera floribunda	x		x	x											x				x	x			
Billardiera fusiformis	x		x	x	x	x				x			x		x	x	x			x			
Billardiera heterophylla			x																				
Billardiera sp.			x														x						
Billardiera variifolia	x		x	x		x	x		x	x		x		x	x	x	x			x			
Boronia crenulata	x		x	x		x	x			x		x	x	x	x	x	x	x	x	x			
Boronia crenulata subsp. *viminea*	x		x	x		x							x		x	x							
Boronia fastigiata	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Boronia molloyae	x		x	x																			
Boronia sp.															x		x						
Boronia spathulata						x	x			x			x	x	x	x	x		x	x			
Borya scirpoidea									x						x							x	
Borya sphaerocephala							x		x	x					x						x	x	x
Bossiaea aquifolium	x		x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Bossiaea eriocarpa	x									x													
Bossiaea ornata	x		x	x		x	x	x		x		x	x	x	x	x	x	x	x	x	x	x	
Brachyscome iberidifolia																						x	
* *Brassica tournefortii*	x												x		x								
* *Briza maxima*																						x	
Burchardia congesta				x		x				x		x	x	x	x	x	x		x	x	x	x	
Caladenia flava															x		x						
Caladenia sp.				x	x					x		x	x	x	x	x	x		x				
Callistachys lanceolata	x		x																				
Callistemon glaucus	x		x										x										
Calothamnus quadrifidus						x	x																
Calothamnus rupestris (P4)				x		x						x	x		x	x			x	x		x	
Calytrix depressa							x						x	x								x	x
Calytrix flavescens	x																						
Calytrix glutinosa																						x	x
Cassytha glabella	x																						
Cassytha glabella forma *glabella*	x																						
Cassytha pomiformis			x																				
Cassytha racemosa																				x			

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	Species	Site-Vegetation Types																					
		AC	AD	CW	W	Q	D	DG	E	P	PW	PG	PT	PS	SP	S	SW	ST	TP	TS	T	R	G1	G2
	Cassytha racemosa forma *pilosa*	x																						
	Cassytha racemosa forma *racemosa*			x																				
	Cassytha sp.	x		x	x		x				x				x	x				x	x	x		
*	*Centaurium erythraea*								x										x		x	x		
	Chamaescilla corymbosa	x		x	x					x	x		x	x	x	x		x		x	x	x		
	Chamaescilla corymbosa var. *corymbosa*	x																						
	Cheilanthes austrotenuiflolia																					x	x	
	Cheilanthes sieberi subsp. *sieberi*																						x	
	Chorizema cordatum	x			x					x			x	x	x	x		x						
	Chorizema rhombeum													x		x	x	x			x			
	Clematis pubescens	x		x	x	x	x			x	x		x	x	x	x	x	x	x	x	x	x	x	
	Comesperma calymega												x	x		x	x			x	x			
	Comesperma ciliatum	x	x																					
	Comesperma confertum							x														x	x	
	Comesperma virgatum	x		x	x		x	x		x	x		x	x	x	x	x	x	x	x	x	x	x	
	Comesperma ?polygaloides										x			x		x	x	x						
	Comesperma sp.								x					x										
	Conospermum capitatum			x	x						x					x	x							
	Conospermum capitatum subsp. *glabratum*						x				x					x					x			
	Conostephium pendulum													x										
	Conostylis aculeata subsp. *aculeata*										x													
	Conostylis pusilla				x		x	x			x		x	x		x	x	x				x	x	
	Conostylis serrulata			x	x		x	x	x	x	x		x	x	x	x	x	x		x	x	x	x	
	Conostylis setigera	x		x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Conostylis setosa	x		x	x		x	x		x	x		x	x	x	x	x	x	x	x	x	x	x	
	Conostylis sp.				x																			
	Corymbia calophylla	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Corynotheca micrantha	x												x	x	x	x					x		
	Craspedia variabilis	x		x	x		x			x	x			x		x	x				x			
	Cryptandra arbutiflora ***var.*** *arbutiflora*																						x	
PL	*Cyathea cooperi*	x		x																				
	Cyathochaeta avenacea	x		x	x		x	x	x		x		x	x	x	x	x	x	x	x	x	x		
	Cyathochaeta teretifolia (P3)	x			x																			
	Cyrtostylis sp.															x				x				
	Dampiera alata			x	x		x	x						x		x		x		x	x			
	Dampiera hederacea	x		x	x											x								
	Dampiera linearis	x	x	x	x		x	x			x		x	x	x	x	x				x			
	Darwinia citriodora													x		x							x	
	Darwinia thymoides subsp. *thymoides*																					x	x	
	Dasypogon bromeliifolius															x								

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES BY SITE-VEGETATION TYPE, MYARA

	Site-Vegetation Types																						
Species	**AC**	**AD**	**CW**	**W**	**Q**	**D**	**DG**	**E**	**P**	**PW**	**PG**	**PT**	**PS**	**SP**	**S**	**SW**	**ST**	**TP**	**TS**	**T**	**R**	**G1**	**G2**
Daviesia cordata																				x			
Daviesia decurrens	x		x	x		x	x	x	x			x	x	x	x	x	x		x		x	x	
Daviesia horrida	x		x	x		x		x					x	x	x	x			x		x	x	
Daviesia incrassata	x		x							x			x	x	x						x		
Daviesia longifolia														x									
Daviesia physodes						x							x		x								
Daviesia preissii				x					x				x	x	x					x			
Daviesia rhombifolia						x			x	x			x	x	x					x	x		
Daviesia sp.			x																				
Desmocladus fasciculatus	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Desmocladus flexuosus			x	x		x	x	x	x	x		x	x	x	x	x	x		x	x	x	x	
Dianella revoluta						x	x		x	x		x	x	x	x	x	x		x	x	x	x	
Dianella revoluta var. *divaricata*						x	x		x	x		x	x	x	x	x	x		x	x	x	x	
Dichelachne crinita															x								
Dillwynia sp.																				x			
Diplolaena microcephala																						x	
Dodonaea ceratocarpa																						x	x
Dodonaea viscosa subsp. *angustissima*																						x	
Drosera erythrorhoza	x		x	x		x			x	x			x	x	x	x	x		x			x	
Drosera gigantea	x																					x	
Drosera gigantea subsp. *gigantea*	x	x				x	x															x	
Drosera hyperostigma	x			x		x	x					x	x			x							
Drosera macrantha													x										
Drosera menziesii						x											x						
Drosera platystigma	x			x		x							x		x	x	x						
Drosera silvicola													x										
Drosera sp.	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Drosera sp. (climbing)				x								x											
Elythranthera brunonis	x																						
Eucalyptus drummondii																						x	
PL *Eucalyptus maculata*						x																	
Eucalyptus marginata	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Eucalyptus megacarpa	x		x	x												x				x			
PL *Eucalyptus microcorys*						x																	
Eucalyptus patens	x	x	x	x	x	x	x	x		x		x				x			x	x		x	
Eucalyptus rudis	x		x	x		x	x						x		x						x	x	
Eucalyptus rudis subsp. *rudis*	x		x																				
Eutaxia virgata							x		x					x									
Exocarpos sparteus														x	x								
Gahnia decomposita	x	x	x	x		x	x						x	x		x					x	x	

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	Site-Vegetation Types																						
Species	**AC**	**AD**	**CW**	**W**	**Q**	**D**	**DG**	**E**	**P**	**PW**	**PG**	**PT**	**PS**	**SP**	**S**	**SW**	**ST**	**TP**	**TS**	**T**	**R**	**G1**	**G2**
Gahnia trifida	x		x																				
Gastrolobium bilobum																						x	x
Gastrolobium calycinum				x					x	x			x			x			x		x		
Gastrolobium ebracteolatum	x		x												x								
Gastrolobium spinosum				x			x			x				x	x						x	x	x
Gastrolobium villosum							x			x				x	x	x	x				x	x	
Glischrocaryon angustifolium	x																						
Glischrocaryon aureum																						x	
Gompholobium cyaninum													x		x								
Gompholobium knightianum				x		x	x	x	x	x		x	x	x	x	x	x		x		x	x	
Gompholobium marginatum	x		x	x		x	x			x		x	x	x	x	x	x		x	x	x	x	
Gompholobium polymorphum			x	x		x			x	x		x	x	x	x	x	x			x	x	x	
Gompholobium preissii				x						x			x		x								
Gompholobium tomentosum															x								
Gonocarpus benthamii	x		x																				
Gonocarpus benthamii subsp. *benthamii* (ms)	x		x									x											
Gonocarpus diffusus	x		x																				
?Gonocarpus sp.														x									
Grevillea ?trifida	x		x	x																			
Grevillea bipinnatifida	x	x		x			x	x		x			x		x		x		x		x	x	x
Grevillea bipinnatifida subsp. *bipinnatifida*	x	x		x			x	x		x			x		x		x		x		x	x	x
Grevillea diversifolia	x		x	x			x					x	x	x	x	x							
Grevillea diversifolia subsp. *diversifolia*	x		x	x			x					x	x	x	x	x							
Grevillea manglesii subsp. *manglesii*	x			x																		x	
Grevillea pulchella				x						x			x	x	x	x					x		
Grevillea puchella subsp. *adscendens*						x			x	x			x	x	x	x	x		x		x	x	
Grevillea quercifolia															x	x							
Grevillea wilsonii	x		x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Haemodoraceae sp.										x		x			x		x			x			
Haemodorum discolor				x								x	x		x	x	x						
Haemodorum sp.			x	x		x	x			x		x	x	x	x		x			x			
Hakea amplexicaulis	x		x	x		x	x			x		x	x	x	x	x	x			x		x	
Hakea cyclocarpa			x	x		x		x	x	x			x	x	x	x					x	x	
Hakea erinacea																						x	
Hakea incrassata	x			x		x			x	x				x		x	x						
Hakea lissocarpha	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Hakea petiolaris subsp. *petiolaris*																						x	
Hakea prostrata	x	x	x	x		x	x		x				x		x								
Hakea ruscifolia	x		x	x		x	x	x	x	x	x	x	x	x	x	x	x		x			x	
Hakea stenocarpa						x	x							x		x							

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	AC	AD	CW	W	Q	D	DG	E	P	PW	PG	PT	PS	SP	S	SW	ST	TP	TS	T	R	G1	G2
Hakea trifurcata				x		x	x			x			x	x	x	x	x		x		x	x	x
Hakea undulata	x		x	x		x	x	x	x				x	x	x	x	x				x	x	
Hakea varia	x						x																
Hardenbergia comptoniana												x		x					x				
Helichrysum luteoalbum												x								x			
Hemiandra pungens													x										
Hemigenia incana																						x	
Hemigenia pritzelii	x	x	x	x		x	x			x		x	x	x	x	x	x			x	x		
Hemiphora bartlingii									x				x								x		
Hibbertia acerosa	x	x	x	x		x	x		x	x		x	x	x	x	x	x	x	x	x	x	x	
Hibbertia amplexicaulis	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Hibbertia commutata	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Hibbertia commutata (hairy form)						x	x																
Hibbertia diamesogenos	x														x		x	x					
Hibbertia huegelii										x		x	x	x	x	x							
Hibbertia hypericoides		x	x	x		x	x			x		x	x	x	x	x	x		x	x	x		
Hibbertia lasiopus				x		x		x	x	x		x	x	x	x	x	x		x	x	x	x	
Hibbertia ovata	x		x	x		x	x		x	x		x	x	x	x	x	x			x	x	x	
Hibbertia pachyrrhiza			x											x	x	x	x					x	
Hibbertia perfoliata	x		x	x		x		x	x	x		x	x	x	x	x	x		x	x	x	x	
Hibbertia pilosa			x												x					x			
Hibbertia quadricolor																				x			
Hibbertia silvestris								x					x	x	x	x	x		x				
Hibbertia vaginata															x								
Hovea chorizemifolia	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Hovea trisperma	x		x	x								x	x		x	x				x			
Hyalosperma cotula	x			x		x	x						x		x	x						x	
Hybanthus calycinus															x								
Hybanthus debilissimus	x			x						x		x	x	x	x		x	x		x			
Hybanthus floribundus subsp. *floribundus*																				x	x	x	
* *Hypericum perforatum*																				x			
Hypocalymma angustifolium	x	x	x	x		x	x	x	x	x			x	x	x	x	x		x	x	x	x	
Hypocalymma cordifolium	x		x	x		x																x	
Hypocalymma cordifolium subsp. *cordifolium*	x		x	x		x																x	
Hypocalymma robustum	x			x		x			x				x	x	x						x	x	
* *Hypochaeris glabra*	x		x	x		x						x	x	x	x			x	x	x		x	
* *Hypochaeris radicata*												x											
* *Hypochaeris* sp.													x		x				x				
Hypolaena exsulca	x	x	x	x		x	x	x		x		x	x			x	x		x		x	x	
* *Isolepis marginata*	x																						

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES BY SITE-VEGETATION TYPE, MYARA

Species	Site-Vegetation Types																						
	AC	AD	CW	W	Q	D	DG	E	P	PW	PG	PT	PS	SP	S	SW	ST	TP	TS	T	R	G1	G2
Isopogon dubius				x		x	x	x			x		x	x	x						x	x	
Isopogon sphaerocephalus								x		x	x		x										
Isopogon sp. Darling Range (F. Hort 1662)				x					x	x			x	x									
Isotoma hypocrateriformis				x		x	x	x		x	x	x	x	x	x	x	x						
Jacksonia alata															x								
Jacksonia furcellata		x																					
Juncus sp.			x			x									x	x							
Kennedia coccinea	x		x	x					x	x		x	x	x	x	x	x	x	x	x	x	x	
Kennedia prostrata			x	x		x	x		x			x	x		x	x	x			x	x		
Kingia australis	x	x	x			x	x	x		x		x	x	x	x					x		x	
Kunzea ericifolia															x								
Kunzea glabrescens									x														
Labichea punctata				x									x	x	x		x		x	x			
Lagenophora huegelii	x	x	x	x	x	x			x	x		x	x	x	x	x	x	x	x	x	x	x	
Lasiopetalum floribundum	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Lasiopetalum glabratum	x		x	x		x		x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Laxmannia squarrosa		x														x						x	
Lechenaultia biloba	x		x	x		x	x	x	x	x		x	x	x	x	x	x		x	x	x	x	
Lepidosperma costale														x			x						
Lepidosperma effusum	x																						
Lepidosperma gracile	x		x	x		x	x			x			x	x	x	x	x		x	x	x		
Lepidosperma leptostachyum						x	x	x	x			x	x	x	x	x	x		x		x	x	
Lepidosperma pubisquameum				x			x			x			x		x					x			
Lepidosperma sp.	x		x							x			x		x								
Lepidosperma squamatum			x			x				x		x	x	x	x	x	x			x		x	
Lepidosperma tenue	x	x	x	x		x	x			x		x	x	x	x	x	x			x	x	x	
Lepidosperma tetraquetrum	x		x	x																		x	
Lepidosperma tuberculatum																						x	
Leptomeria cunninghamii	x			x		x	x			x		x	x	x	x	x	x			x			
Leptospermum erubescens	x					x	x	x	x	x			x	x	x	x	x				x	x	
* *Leptospermum laevigatum*	x			x		x																	
Leucopogon australis	x																						
Leucopogon capitellatus	x		x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Leucopogon glabellus												x	x		x							x	
Leucopogon hirsutus	x		x																				
Leucopogon nutans	x		x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Leucopogon propinquus	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Leucopogon pulchellus	x	x	x	x		x	x		x				x		x	x				x		x	
Leucopogon strictus																						x	
Leucopogon verticillatus	x		x	x				x	x			x	x	x	x	x	x	x	x	x	x	x	

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES BY SITE-VEGETATION TYPE, MYARA

	Site-Vegetation Types																						
Species	**AC**	**AD**	**CW**	**W**	**Q**	**D**	**DG**	**E**	**P**	**PW**	**PG**	**PT**	**PS**	**SP**	**S**	**SW**	**ST**	**TP**	**TS**	**T**	**R**	**G1**	**G2**
Leucopogon sp.																						x	
Levenhookia preissii												x								x			
Levenhookia pusilla	x											x	x	x	x	x			x	x		x	
Levenhookia stipitata							x																
Lindsaea linearis	x	x	x	x		x	x			x			x		x	x				x			
Lobelia gibbosa				x			x			x			x	x	x	x							
Lobelia heterophylla															x	x							
Lobelia rhombifolia						x	x																
Logania campanulata				x												x					x		
Logania serpyllifolia	x			x		x			x	x		x	x		x	x				x		x	
Logania serpyllifolia subsp. *angustifolia*						x	x																
Logania serpyllifolia subsp. *serpyllifolia*				x									x		x	x				x			
Lomandra brittanii	x		x									x	x		x	x	x		x	x			
Lomandra caespitosa	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x		x	
Lomandra drummondii	x		x	x		x	x		x	x		x	x	x	x	x	x	x	x	x	x	x	
Lomandra hermaphrodita	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Lomandra integra																	x			x			
Lomandra micrantha subsp. *micrantha*	x		x	x		x			x	x		x	x	x	x	x	x	x	x	x	x		
Lomandra nigricans				x		x				x			x		x	x	x		x				
Lomandra pauciflora																				x			
Lomandra preissii			x	x						x		x	x	x	x	x	x	x		x			
Lomandra purpurea						x							x		x	x	x		x				
Lomandra sericea			x	x		x	x		x			x	x	x	x	x	x	x					
Lomandra sonderi	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Lomandra sp.	x									x			x	x	x						x		
Lomandra spartea	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Loxocarya cinerea	x		x	x		x	x		x	x		x	x	x	x	x	x	x	x	x	x	x	
Lyginia barbata	x		x	x		x	x			x		x	x	x	x	x				x			
* *Lysimachia arvensis*																x							
Macrozamia riedlei	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Marianthus drummondianus			x						x				x	x	x	x	x			x			
Marianthus tenuis						x									x						x	x	
Meeboldina coangustata	x		x	x																			
Meeboldina scariosa	x		x																				
Melaleuca incana subsp. *incana*	x		x	x		x	x					x				x							
Melaleuca lateritia	x	x								x			x			x							
Melaleuca parviceps				x		x	x	x	x	x	x		x			x					x	x	x
Melaleuca pauciflora			x																				
Melaleuca preissiana	x	x	x	x		x	x									x						x	
Melaleuca rhaphiophylla	x																						

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Species	Site-Vegetation Types																					
	AC	AD	CW	W	Q	D	DG	E	P	PW	PG	PT	PS	SP	S	SW	ST	TP	TS	T	R	G1	G2
Melaleuca trichophylla								x	x	x	x		x		x							x	
Melaleuca viminea	x		x			x																	
Mesomelaena tetragona	x	x		x		x	x	x								x							
Mirbelia dilatata	x		x	x		x	x	x	x	x		x	x		x	x	x		x	x	x	x	
Monotaxis grandiflora				x		x	x			x			x		x	x	x						
Monotaxis occidentalis	x		x			x		x		x			x	x	x	x	x		x	x	x	x	
Myrtaceae sp.			x																				
Neurachne alopecuroidea	x		x	x		x	x	x	x	x		x	x	x	x	x	x		x	x	x	x	
Nuytsia floribunda	x	x				x	x									x							
Olax benthamiana													x		x	x	x						
Opercularia apiciflora													x		x		x	x		x			
Opercularia echinocephala	x		x	x		x	x		x	x		x	x	x	x	x	x	x	x	x	x	x	
Opercularia hispidula												x	x		x	x	x		x	x	x		
Opercularia vaginata															x				x				
Orchidaceae sp.	x		x	x		x				x		x	x		x	x	x		x	x	x		
* *Orobanche minor*				x																			
* *Oxalis corniculata*																	x		x	x			
* *Oxalis pes-caprae*				x															x				
Paraserianthes lophantha subsp. *lophantha*	x		x											x						x			
Patersonia babianoides				x								x	x		x		x			x			
Patersonia occidentalis	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Patersonia pygmaea				x		x		x	x	x			x		x	x					x		
Patersonia rudis subsp. *rudis*	x			x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x		
Pentapeltis peltigera	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x		
Pericalymma ellipticum	x		x	x		x	x	x		x			x	x	x						x	x	x
Persoonia elliptica	x		x	x					x	x		x	x	x	x	x	x		x	x	x	x	
Persoonia longifolia			x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Petrophile biloba						x															x	x	
Petrophile heterophylla															x								
Petrophile linearis															x	x							
Petrophile serruriae							x			x			x		x						x	x	
Petrophile striata										x				x							x	x	x
Philotheca spicata	x		x	x		x	x					x	x	x	x	x		x	x	x		x	
Philydrella drummondii	x																						
Phlebocarya ciliata						x			x				x	x	x						x		
Phyllangium paradoxum												x		x				x					
Phyllanthus calycinus	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
* *Phytolacca octandra*				x																			
Pimelea ciliata															x					x	x	x	
Pimelea ciliata subsp. *ciliata*															x					x	x	x	

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES BY SITE-VEGETATION TYPE, MYARA

	Site-Vegetation Types																						
Species	**AC**	**AD**	**CW**	**W**	**Q**	**D**	**DG**	**E**	**P**	**PW**	**PG**	**PT**	**PS**	**SP**	**S**	**SW**	**ST**	**TP**	**TS**	**T**	**R**	**G1**	**G2**
Pimelea lanata			x										x										
Pimelea lehmanniana										x													
Pimelea sp.			x	x									x			x							
Pimelea spectabilis															x								
Pimelea suaveolens	x		x	x		x	x			x		x	x	x	x	x	x		x	x			
Pimelea suaveolens subsp. *suaveolens*			x	x		x	x		x	x		x	x	x	x	x	x	x	x		x	x	
* *Pinus pinaster*				x		x																	
* *Pinus radiata*				x		x																	
Platysace compressa	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x		
Platysace filiformis	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Platysace tenuissima	x		x	x		x	x		x	x		x	x	x	x	x	x	x	x	x	x		
Poaceae sp.	x		x	x								x								x			
Podocarpus drouynianus													x										
Podolepis gracilis	x	x	x	x		x	x								x	x							
Podolepis lessonii															x								
Podotheca gnaphalioides																x							
Poranthera microphylla															x								
Pteridium esculentum	x		x	x		x		x		x		x	x	x	x	x	x	x	x	x	x		
Pterochaeta paniculata	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x				x	x	
Pterostylis sp.	x		x	x					x				x	x	x	x	x		x	x			
Pterostylis drummondii																x							
Ptilotus manglesii						x			x	x			x		x	x							
Ptilotus sp.													x										
Pyrorchis nigricans				x					x	x		x	x	x	x	x	x		x	x			
Ranunculus colonorum				x											x								
Restionaceae sp.	x			x												x							
Rhodanthe citrina						x																	
* *Robinia pseudoacacia*			x																				
Samolus junceus									x														
Scaevola calliptera	x		x	x		x		x	x	x		x	x	x	x	x	x		x	x		x	
Scaevola pilosa																			x				
Schoenus sp.															x								
* *Senecio diaschides*			x	x		x	x			x		x	x	x	x	x	x	x		x			
Senecio hispidulus	x		x	x		x	x			x		x	x	x	x	x	x		x	x	x	x	
Senecio hispidulus var. *hispidulus*	x		x	x		x	x			x		x	x	x	x	x	x		x	x	x	x	
Senecio leucoglossus (P4)	x			x								x	x		x		x	x	x	x			
Senecio quadridentatus	x			x			x					x	x		x	x	x			x			
* *Senecio* sp.			x	x		x						x	x	x	x	x	x		x	x	x		
* *Senecio vulgaris*												x			x		x		x	x			
Siloxerus humifusus	x		x	x		x	x					x			x	x						x	

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Species	Site-Vegetation Types																						
	AC	AD	CW	W	Q	D	DG	E	P	PW	PG	PT	PS	SP	S	SW	ST	TP	TS	T	R	G1	G2
* *Sonchus oleraceus*												x											
Spartochloa scirpodea																						x	
Sphaerolobium linophyllum															x					x			
Sphaerolobium medium	x					x	x						x	x	x	x				x			
Sphaerolobium vimineum	x		x	x																			
Sporadanthus rivularis (ms)	x		x												x								
Stackhousia monogyna	x		x			x	x								x							x	
Stachystemon vermicularis										x			x										
Strilingia latifolia															x								
Stylidium amoenum	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x		x	x	x	x	
Stylidium androsaceum				x								x			x	x		x		x			
Stylidium brunonianum	x	x		x						x					x	x						x	
Stylidium bulbiferum						x	x			x		x	x		x		x					x	
Stylidium ciliatum										x		x	x	x	x		x						
Stylidium calcaratum	x		x	x		x	x			x		x	x		x	x			x	x			
Stylidium crassifolium	x																						
Stylidium dichotomum															x								
Stylidium diuroides subsp. *diuroides*						x			x				x		x							x	
Stylidium ireneae (P4)	x		x	x		x									x	x							
Stylidium junceum	x		x						x	x		x	x		x					x			
Stylidium lateriticola								x						x	x								
Stylidium lineatum				x									x		x								
Stylidium longitubum (P3)	x			x																			
Stylidium piliferum	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	
Stylidium repens			x							x					x								
Stypandra glauca																						x	
Stylidium sp.	x														x								
Styphelia tenuiflora	x		x	x		x	x	x	x	x		x	x	x	x	x	x		x	x	x	x	
Synaphea damopsis										x													
Synaphea gracillima														x									
Synaphea petiolaris subsp. *petiolaris*			x			x		x	x	x			x		x	x					x	x	
Taxandria linearifolia	x	x	x	x	x	x	x	x		x		x				x			x	x	x	x	
Tetraria capillaris	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Tetraria octandra	x		x	x		x	x	x	x	x			x		x	x	x	x	x	x	x	x	
Tetrarrhena laevis	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Tetratheca hirsuta	x		x	x		x	x		x	x		x	x	x	x	x	x	x	x	x		x	
Tetratheca hispidissima						x							x	x	x		x			x			
Tetratheca setigera						x	x								x								
Thelymitra crinita																x							
Thelymitra macrophylla	x	x	x	x		x	x			x		x	x	x	x	x	x	x		x			

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	Species	Site-Vegetation Types																					
		AC	AD	CW	W	Q	D	DG	E	P	PW	PG	PT	PS	SP	S	SW	ST	TP	TS	T	R	G1	G2
	Thelymitra ***sp.***	x	x	x	x		x	x					x	x	x	x	x	x			x			
	Thomasia paniculata	x	x	x	x								x	x	x	x				x	x			
	Thysanotus dichotomus	x		x	x		x		x		x		x	x	x	x	x	x	x	x	x	x	x	
	Thysanotus fastigiatus	x		x	x		x		x		x		x	x	x	x	x	x	x	x	x	x	x	
	Thysanotus manglesianus										x					x	x					x		
	Thysanotus multiflorus	x		x	x						x		x	x	x	x	x	x		x	x			
	Thysanotus sp.										x			x	x	x		x			x			
	Thysanotus sparteus									x														
	Thysanotus tenellus	x		x	x		x	x			x		x	x	x	x	x	x	x		x			
	Thysanotus thyrsoideus				x								x	x		x								
	Thysanotus triandrus										x													
PL	*Tipuana tipu*	x		x	x																			
	Trachymene pilosa			x						x	x		x	x	x	x	x	x			x			
	Trichocline spathulata	x		x	x		x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Tricoryne elatior															x					x			
	Tricoryne humilis				x		x	x		x						x								
*	*Trifolium repens*				x		x																	
*	*Trifolium* sp.																			x				
	Tripterococcus brunonis	x			x									x		x	x							x
	Trymalium ledifolium	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
	Trymalium odoratissimum subsp. *odoratissimum*	x		x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Typha sp.						x																	
*	*Ursinia anthemoides*															x					x			
	Utricularia multifida	x					x	x							x	x								
*	*Verbascum virgatum*				x																			
	Verticordia huegelii var. *huegelii*						x																x	
	Verticordia densiflora var. *densiflora*																						x	
	Verticordia pennigera																						x	
	Verticordia plumosa var. *brachyphylla*	x																					x	
	Verticordia plumosa var. *plumosa*			x			x									x							x	x
	Verticordia sp.																						x	
	Villarsia parnassiifolia	x		x																				
	Viminaria juncea	x		x																			x	
	Waitzia suaveolens var. *suaveolens*				x		x																	
	Xanthorrhoea gracilis	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
	Xanthorrhoea preissii	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
	Xanthosia atkinsoniana	x		x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Xanthosia candida	x		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
	Xanthosia huegelii	x					x	x					x	x		x	x	x			x			
	Xanthosia singuliflora				x										x	x								
	Xylomelum occidentale	x	x		x									x	x	x	x							

FLORA & VEGETATION ASSESSMENT

OF THE LAREGO AREA

Prepared By

Mattiske Consulting Pty Ltd

Prepared For

Alcoa of Australia Limited

SEPTEMBER 2019




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DOCUMENT REFERENCE: ALC1901/58/2018				
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V3	Final			

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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
DotEE:	Department of the Environment and Energy
EP Act:	*Environmental Protection Act 1986* (WA)
EPA:	Environmental Protection Authority
EPBC Act:	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
Mattiske:	Mattiske Consulting Pty Ltd
PEC:	Priority ecological community
TEC:	Threatened ecological community
WAH:	Western Australian Herbarium (PERTH)
WAOL:	Western Australian Organism List
WC Act:	*Wildlife Conservation Act 1950* (WA)

EXECUTIVE SUMMARY

Mattiske Consulting Pty Ltd was commissioned in March 2019 by Alcoa to assess the flora and vegetation within the Larego areas, south of the Willowdale mine. Four separate areas within the Larego area were surveyed, covering 1335.79 ha in total. A total of 983 recording sites were assessed during this survey.

A total of 242 vascular plant taxa, representative of 109 genera and 49 families, were recorded within the Larego survey areas. The majority of taxa recorded were representative of the Fabaceae (38 taxa), Myrtaceae (22 taxa), Proteaceae (17 taxa) and Asparagaceae (13 taxa) families. The majority of the taxa recorded were widespread both locally and more broadly within the associated biogeographical subregion.

No threatened flora species pursuant to subsection (2) of section 23F of the WC Act and as listed by the DBCA (2019a), or pursuant to section 179 of the EPBC Act or listed by the DotEE (2019c), were recorded within the Larego survey areas. Three Priority flora species were recorded in the Larego survey areas, including *Lepyrodia curvescens* (P2), *Senecio leucoglossus* (P4) and *Tetratheca pilifera* (P3).

A total of seven introduced (weed) species were recorded within the Larego survey areas. **Rubus ulmifolius* (forms part of listed aggregate Blackberry species) which is a declared pest organisms pursuant to section 22 of the BAM Act (DPIRD 2019) and is listed as a Weed of National Significance (WONS) (DotEE 2019d). The majority of these weeds were recorded near moister soils on the valley systems and near creeklines (CW site-vegetation type).

No Threatened or Priority Ecological Communities were recorded within the Larego survey areas.

A total of 17 site-vegetation types were defined and mapped within the Larego survey areas. These units were based on the earlier studies by Havel (1975a and 1975b). The site-vegetation types PT (11.01%), S (23.25%), T (12.30%) and TS (20.87%) are dominant in the Larego survey areas on the mid and upper slopes, and are typical of the Dwellingup vegetation complex that dominates the sandy-gravel soils on drier slopes, as defined by Heddle *et al.* (1980) and Mattiske and Havel (1998).

The results reflect several key values, namely:

- The presence of three Priority flora species;
- the occurrence of the R site-vegetation type in association with shallow soils over granite outcrops.
- the occurrence of the E site-vegetation type that occur on the sandier end of the gravels to sand soil continuum.
- the occurrence of the SW and PW site-vegetation types on the seasonally moister soils on lower and mid slopes. These types reflect site conditions that may influence the need to avoid seasonally moister areas during operational activities due to the potential presence of dieback (*Phytophthora cinnamomi*).
- the dominance of the site-vegetation types – PT, S, T and TS on the sandy-gravel and drier mid and upper slopes.

All of these site-vegetation types are well represented in the Northern Jarrah Forest, although some occur in localised areas (e.g. R and E) thereby providing a local diversity of inherent flora and vegetation values.

1. INTRODUCTION

Mattiske Consulting Pty Ltd (Mattiske) was commissioned in March 2019 by Alcoa to undertake a flora and vegetation assessment of four separate areas within the Larego area. The purpose of the assessment was to provide information pertaining to mining approvals. The Larego area is located in State Forest, south of the existing Willowdale mine site, and approximately 20 km East of Waroona (Figure 1). For this assessment, the Larego area consists of four separate areas, each consisting of multiple Alcoa grid blocks (see Methods: section 4). Hereafter all four areas are referred to as the survey area unless specifically identified as survey area 1, 2, 3 or 4 (as shown in Figure 1). The survey area covered 1335.79 ha in total.

1.1. 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 include the:

- *Biodiversity Conservation Act 2016* (BC Act);
- *Biosecurity and Agriculture Management Act 2007* (BAM Act); and
- *Environmental Protection Act 1986* (EP Act).

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

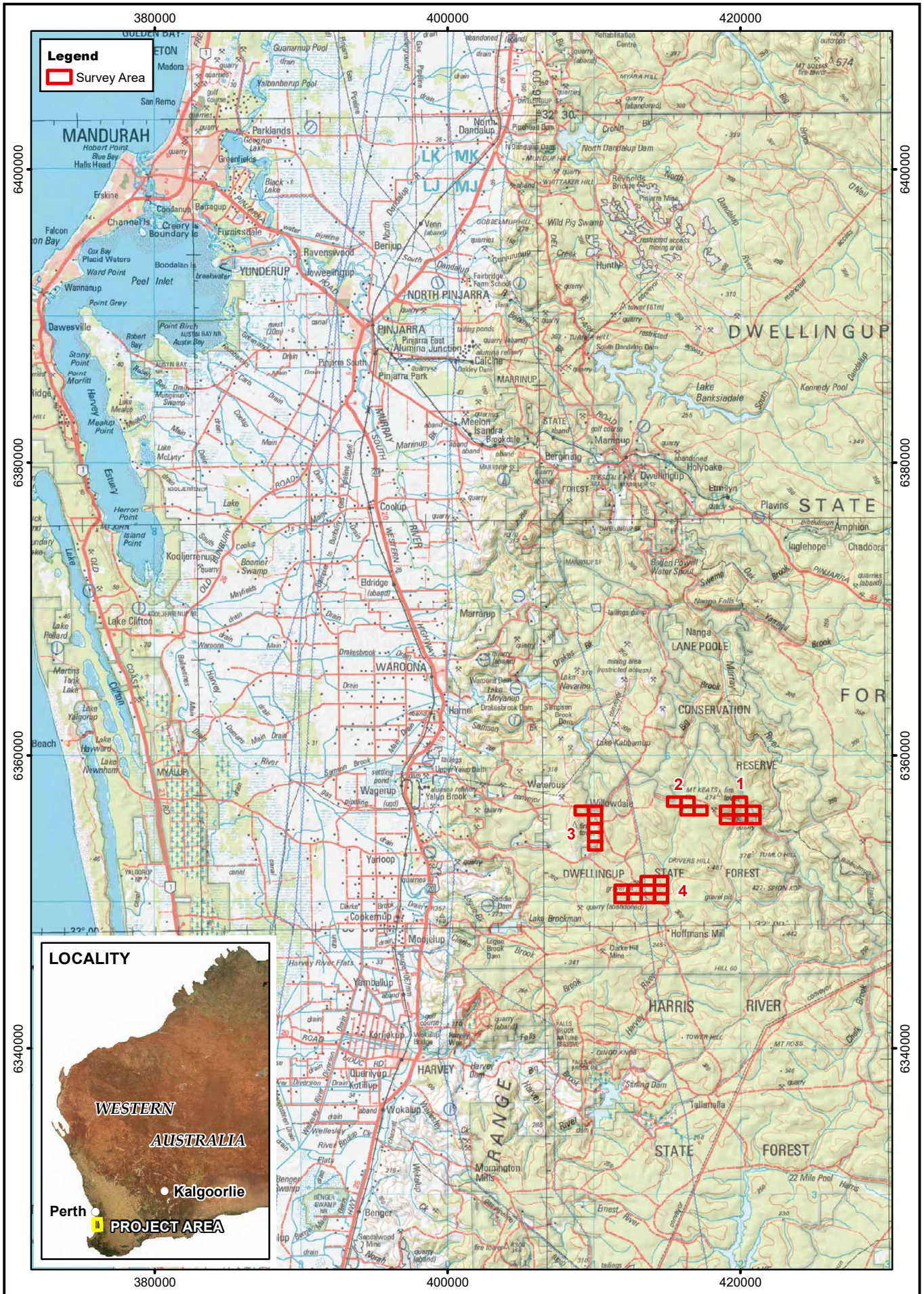
- *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority [EPA] 2016a); and
- *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b).

Definitions of flora and vegetation terminology commonly used throughout this report are provided in Appendix A1-3.

2. BACKGROUND

2.1. Regional Context

According to Beard (1990) the survey area lies within the Northern Jarrah Forest subregion of the Southwest Forest Region. More recently, the vegetation of Western Australia has been assigned to bioregions and subregions under the Interim Biogeographical Regionalisation for Australia (IBRA; Thackway and Cresswell 1995; Department of the Environment and Energy 2019a). The survey area lies within the Northern Jarrah Forest Subregion (JF1) of the Jarrah Forest (JAF) Region under the IBRA (Version 7).



N

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Scale: 1:350,000
MGA94 (Zone 50)

CAD Ref: a1992_LarExt_F03_01

Date: April 2019 | Rev: A | A4

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Willowdale Project - Larego Extension Areas

Location

Figure: 1

2.2. 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. While Wagerup refinery has the closest weather station to the survey area, it experiences a differing climate to the survey area being on the Swan Coastal Plain. Therefore, Dwellingup weather station was considered more appropriate even though it is further from the survey area. Annual average rainfall at Dwellingup is 1233 mm (Bureau of Meteorology [BOM] 2019). Although the summer months were drier (as expected) above average rainfall was received in the previous winter months and also in June 2019(Figure 2).

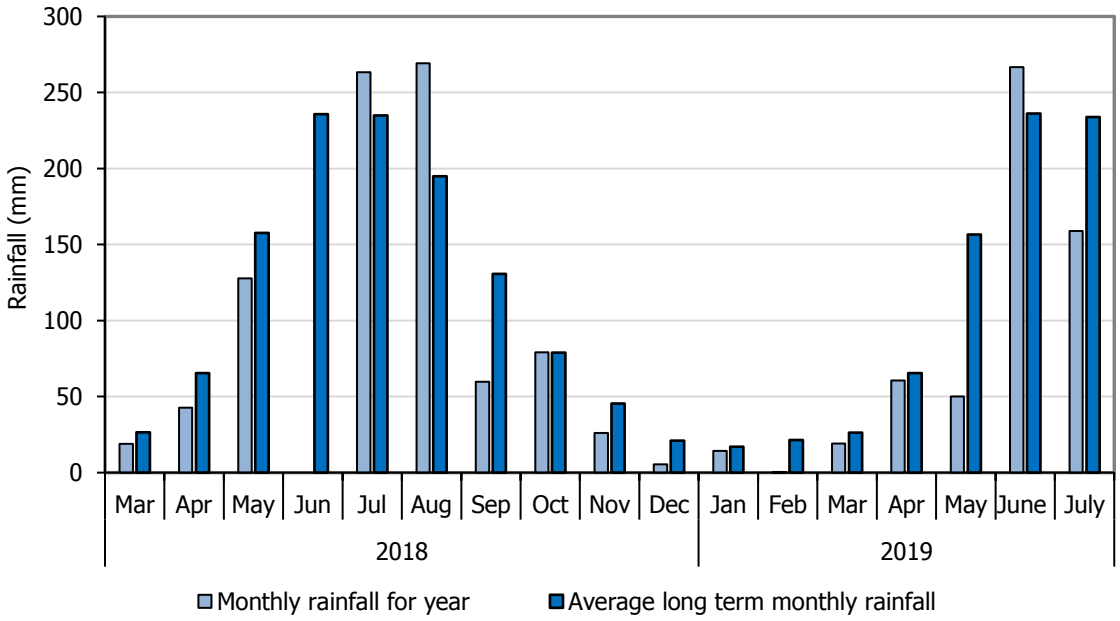


Figure 2: Monthly and long term average rainfall for the Dwellingup weather station

Note: Long-term average monthly rainfall from 1935 to 2018 (BOM 2019).

2.3. Landforms and Soils

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 four main landform and soil units occurring within the survey area, these are:

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

Helena - Very deeply incised valleys with steep rocky slopes and some shallow red or yellow earths.

Murray - Deeply incised valleys with red and yellow earths on slopes; narrow alluvial terraces.

Yarragil - Valleys of the western part of the plateau; sandy gravels on the slopes; orange earth in swampy floors.

2.4. Regional Vegetation

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 a 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).

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 and determined how they relate to the landforms, soils and climatic conditions. Five broad vegetation complexes occur in the general Larego area (Figure 3), these are:

Cooke (Ce)

Mosaic of open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on deeper soils adjacent out outcrops with a closed heath of Myrtaceae-Proteaceae species on lithic complex on granite rocks, with some *Eucalyptus laeliae* and *Allocasuarina huegeliana* in semi-arid areas.

Dwellingup 1 (D1)

Open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on lateritic uplands in mainly humid and subhumid zones.

Helena 1 (He1)

Mosaic of open forest of *Corymbia calophylla – Eucalyptus patens* - *Eucalyptus marginata* subsp. *marginata* with some *Eucalyptus rudis* on the deeper soils ranging to closed heath and lithic complex on shallow soils associated with granite on steep slopes of valleys in humid and subhumid zones.

Murray 1 (My1)

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

Yarragil 1 (Yg1)

Open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on slopes with mixtures of *Eucalyptus patens* and *Eucalyptus megacarpa* on the valley floors in humid to subhumid zones.

3. OBJECTIVES

The objective of this survey was to undertake a flora and vegetation assessment of the Larego survey area, more specifically:

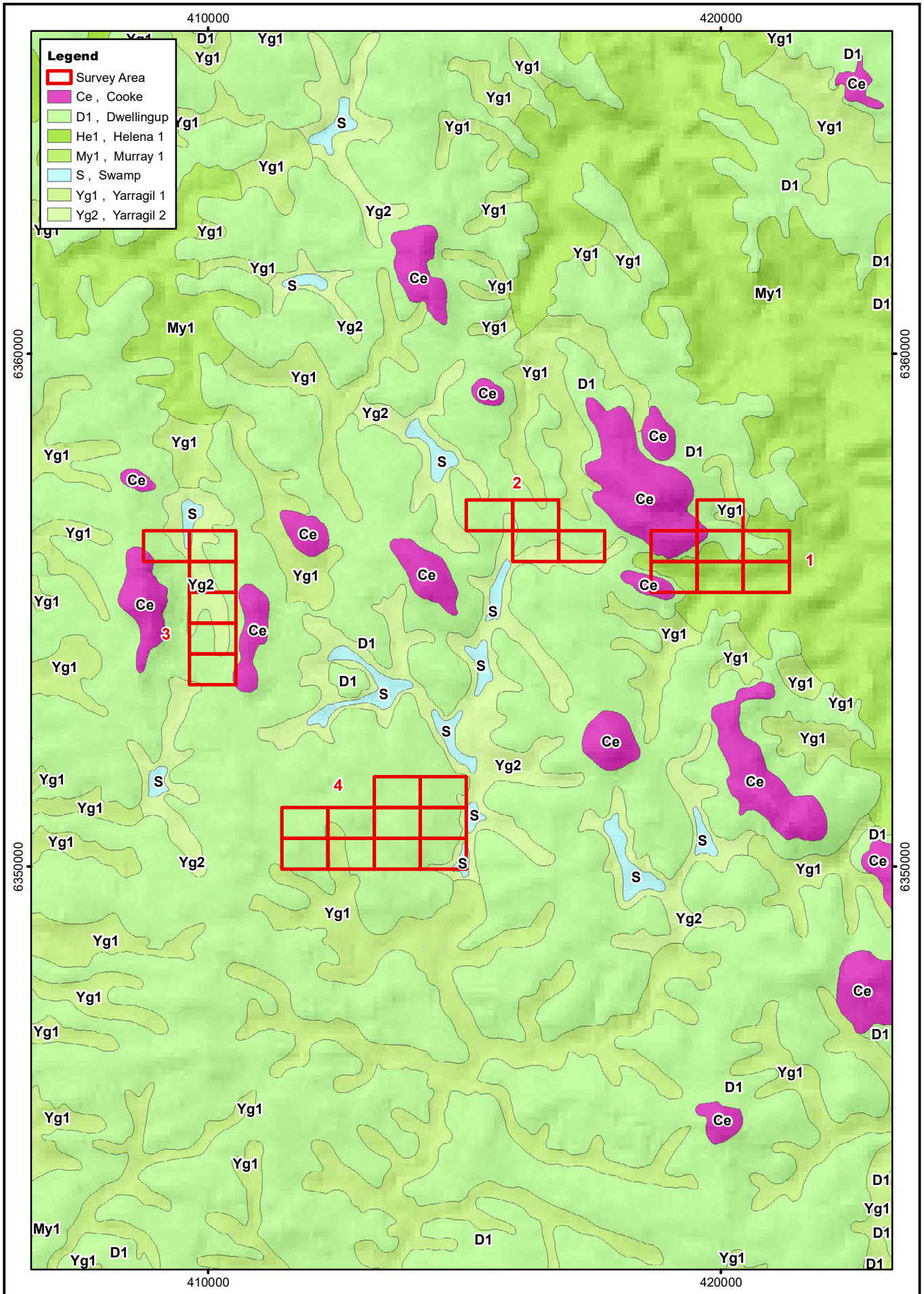
- Undertake a desktop study of the flora and vegetation of the survey area, with an emphasis on threatened and priority flora, and threatened and priority ecological communities;
- Undertake a Reconnaissance level field assessment of the survey area, and collect and identify the vascular plant species present;
- Review the conservation status of the vascular plant species recorded by reference to current literature and listings by the Department Biodiversity, Conservation and Attractions (DBCA) and plant collections held at the Western Australian State Herbarium (WAH), and listed by the Department of the Environment and Energy (DotEE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- Describe and map the vegetation of the survey area;
- Define and map the location of any threatened, priority and Declared pest flora located within the survey area;
- Prepare a report summarising the findings.

4. METHODS

The Larego area consisted of four separate survey areas, identified as Area 1, Area 2, Area 3 and Area 4 (collectively the survey area; Table 1 and Figure 3). The flora and vegetation of the survey area was assessed by xx experienced botanists from March to July 2019. This work extends extensive work in the Willowdale, Larego and Keats areas by E.M. Mattiske and Associates (1993, 1994a, 1994b) and Mattiske Consulting Pty Ltd (1996, 1997, 2001, 2012, 2015 and 2018).

Table 1: Area (ha) and Alcoa grid reference numbers for survey areas within the Larego survey area, 2019

Area	Area (ha)	Alcoa Grids (Part or Entire)
1	241.94	E5419, E5420, Ef5424, E5428, E5504, E5508
2	471.38	F5524, F5526, F5527, F5528, F5602, F5603, F5604, G5521, G5525, G5601
3	244.78	G5414, G5415, G5419, G5420
4	377.98	H5415, H5418, H5419, H5420, H5422, H5423, H5424



N

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

CAD Ref: a1992_LarExt_F03_03

Date: April 2019 | Rev: A | A4

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Willowdale Project - Larego Extension Areas

Regional Forest Agreement Vegetation

Figure: **3**

4.1. Desktop Assessment

A desktop assessment was conducted using NatureMap (DPaW 2007-) and The EPBC Act Protected Matters Search Tool databases to identify the possible occurrence of threatened and priority flora and threatened and priority ecological communities within the survey area. Database searches were in a 10 km radius based on a central point between the four survey areas (coordinates: 32° 57′ 4″S and 116° 5′ 9″). Each threatened of priority flora species identified as potentially occurring within the survey area was ranked as to the likelihood of it occurring. Ranking (Low, Medium and High) was based on the likelihood of suitable habitat within the survey area, proximity of previous records and distribution of previous records to the survey area.

A review of previous flora and vegetation studies by Mattiske was undertaken. Further investigation was considered unwarranted given the substantial and locally relevant reference material available.

4.2. Field Survey

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 120 x 120 m 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-).

5. DESKTOP ASSESSMENT RESULTS

5.1. Potential Threatened and Priority Flora

No threatened flora species, pursuant to section 171 (2) of the *Biodiversity Conservation Regulations 2018* (Table 2; Appendix B) were identified as potentially occurring within the survey area. Six priority flora species as listed by WAH (1998-) were identified as potentially occurring within the survey area (Table 2; Appendix B). A brief description of each follows.

Table 2: Threatened and priority flora potentially occurring within the Larego survey areas

Note: SCC = State Conservation Code, FCC = Federal Conservation Code

Species	SCC	FCC	Likelihood of occurring in survey area
Tetraria sp. Nannup (P.A. Jurjevich 1133)	P1	-	Low-medium
Schizaea rupestris	P2	-	Low
Actinotus repens	P3	-	Low-medium
Cyathochaeta teretifolia	P3	-	High
Grevillea prominens	P3	-	Medium
Senecio leucoglossus	P4	-	High

***Tetraria* sp. Nannup (P.A. Jurjevich 1133) (P1)** – A multi stemmed, slender, rhizomatous sedge growing up to 90 cm. Flowering period is unknown. Grows in yellow-grey sand and clayey loam (WAH 1998-).

***Schizaea rupestris* (P2)** – A rhizomatous fern with simple, glossy fronds. Growing up to 20 cm high, found in sandy soils of gullies, creek banks and shaded moist rock faces. Generally recorded along the south coast of Western Australia (WAH 1998-).

***Actinotus repens* (P3)** – A prostrate herb, growing up to 10 cm high. It produces white flowers from October to April. Generally recorded along the south coast of Western Australia, it grows in yellow-brown or red-brown sand or clay-loam (WAH 1998-).

***Cyathochaeta teretifolia* (P3)** – A robust, rhizomatous, clumped sedge growing up to 2 m high producing brown flowers. Found growing in grey sand, sandy clay along creek edges and swamps.

***Grevillea prominens* (P3)** – A spreading shrub, growing up to 1.5 m high and 1 m wide. It produces cream-white flowers from September to October. Found along creeklines and slopes growing in sand and clayey-sandy areas, often with laterite (WAH 1998-).

***Senecio leucoglossus* (P4)** – An erect, annual herb, growing up to 1.3 m high. Grows in brown sands, clay and lateritic gravel on slopes, often associated with granite outcrops (WAH 1998-).

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

Twelve introduced species were identified as potentially occurring within the survey area (DPaW 2007; DotEE 2019b). Of these none were Declared (plant) pests pursuant to the BAM Act (DPIRD 2019).

5.3. Potential Threatened and Priority Ecological Communities

No Federally listed TEC's were identified as potentially occurring within the survey area (DotEE 2019b). No PEC's were identified as potentially occurring within the survey area (DBCA 2017b).

5.4. Previous Mattiske Surveys

E.M. Mattiske and Associates (1993, 1994a, 1994b) and Mattiske Consulting Pty Ltd (1996, 1997, 2001, 2012, 2015 and 2018) have previously mapped the vegetation associated with the Willowdale mine (Figure 4). The 2015 and 2018 surveys are most relevant to the current survey, as the current four survey areas border these survey areas.

The 2015 survey consisted of two areas (South Keats and South Larego), covering a combined area of 1540.23 ha. A total of 257 vascular plant taxa were recorded from both areas, consisting of 132 genera and 49 families. No threatened flora were recorded. Two priority flora taxa were recorded; *Cyathochaeta teretifolia* (P3) and *Senecio leucoglossus* (P4). Eight introduced plant taxa were recorded, of which none were Declared (plant) pests (Department of Primary Industries and Regional Development [DPIRD] 2019).

Nineteen vegetation types were defined and mapped across both survey areas (Mattiske 2015). The most dominant vegetation type was **S**, an 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. Followed by **PS**, an open forest of *Allocasuarina fraseriana - Eucalyptus marginata - Corymbia calophylla - Banksia grandis* with scattered understorey, including *Adenanthos barbiger, Leucopogon capitellatus* on gravels and sandy gravels. Then by **TS**, an 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. No TEC's or PEC's were recorded within either survey area.

The 2018 survey consisted of one area covering 216 ha. A total of 175 vascular plant taxa were recorded, consisting of 92 genera and 45 families. No threatened or priority flora were recorded. Three introduced plant taxa were recorded, of which none were Declared (plant) pests (DPIRD 2019).

Twelve vegetation types were mapped and defined across the survey area (Mattiske 2018). The most dominant vegetation types were the same as that of the 2015 survey above, dominated by the **S** type, however contrary to the 2015 survey, the **TS** vegetation type was more prominent than the **PS**. No TEC's or PEC's were recorded within the survey area.

410000 415000 420000

6355000

6350000

E5419 E5420 E5424 E5428 E5504 E5508

G5414 G5415 G5419 G5420

H5415 H5418 H5419 H5420 H5422 H5423 H5424

F5524 G5521 F5526 F5527 F5528 G5525 F5602 F5603 F5604 G5601

Legend

AC D PS R SW W Sheets to be mapped
C DA PT S T
CA E PW SP TP
CW P Q ST TS

Note: Aerial Photography: Landgate (Jan 2017)

Client: ALCOA

N

0 820 m

Scale: 1:40,000
MGA94 (Zone 50)

CAD Ref: a1992_LarExt_F03_04

Date: Apr 2019 | Rev: A | A3

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Larego Extension Survey Areas
Previous Mattiske Vegetation Mapping

Figure: 4

6. FIELD SURVEY RESULTS

6.1. Flora

A total of 242 vascular plant taxa, representative of 109 genera and 49 families, were recorded within the Larego survey areas. The majority of taxa recorded were representative of the Fabaceae (38 taxa), Myrtaceae (22 taxa), Proteaceae (17 taxa) and Asparagaceae (13 taxa) families (Appendix C). The majority of the taxa recorded were widespread both locally and more broadly within the associated biogeographical subregion. The representation of the species within the site-vegetation types is summarised in Appendix D.

6.1.1. Threatened and Priority Flora

No threatened flora species pursuant to subsection (2) of section 23F of the WC Act and as listed by the DBCA (2019a), or pursuant to section 179 of the EPBC Act or listed by the DotEE (2019c), were recorded within the Larego survey areas.

Three Priority flora species were recorded in the Larego survey areas, see Table 3, including *Lepyrodia curvescens* (P2), *Senecio leucoglossus* (P4) and *Tetratheca pilifera* (P3).

Table 3: Locations of Priority Flora species in the Larego survey areas

Species	Grid Ref	Site-Vegetation Type	GDA94_Z50H	
			Easting (mE)	Northing (mN)
Lepyrodia curvescens (P2)	E5504 2440	CW	410235	6354373
Senecio leucoglossus (P4)	F5602 2408	S	411551	6350192
	F5602 1608	S	411560	6350305
	F5602 3224	S	411797	6350070
	F5602 1624	S	411800	6350312
	F5604 0848	TS	413958	6350422
	F5604 0856	TS	414078	6350423
	G5521 3212	TS	414312	6351262
	G5420 1624	T	417201	6356314
	H5421 4060	TS	418635	6355346
	H5417 2460	PS	418636	6356190
	H5422 4008	S	418764	6355346
	H5418 2408	PT	418766	6356190
	H5418 1640	PS	419240	6356305
	H5419 1612	TS	419717	6356314
	G5601 0804	TS	414201	6350422
	G5601 4012	CW	414316	6349946
Tetratheca pilifera (P3)	G5525 2404	S	414205	6350787

Lepyrodia curvescens (P2) was recorded at one location within the CW site-vegetation type near the creeklines. This species is currently known from 20 records at the State Herbarium (WAH 1998-). This species mainly occurs on the northern fringes of the Darling Ranges and on the northern sandplains.

***Senecio leucoglossus* (P4)** – was recorded at a few locations and largely on the mid and upper slopes supporting site-vegetation types (S, TS, T, PS and PT), although at one location within the CW site-vegetation type near the creeklines. This species is currently known from 43 records at the State Herbarium (WAH 1998-). This species occurs mainly within the northern and central Jarrah forest on the Darling Ranges and is considered to be poorly known rather than threatened as it occurs as an occasional group of plants in surveys.

Tetratheca pilifera **(P3)** – was recorded at one location within the S site-vegetation type on the slopes and ridges. This species is currently known from 33 records at the State Herbarium (WAH 1998-). This species occurs mainly within the northern Jarrah forest on the Darling Ranges.

6.1.2 Introduced (Weed) Species and Declared Pest (Plant) Organisms

A total of seven introduced (weed) species were recorded within the Larego survey areas (Table 4). **Rubus ulmifolius* (forms part of listed aggregate Blackberry species) which is a declared pest organisms pursuant to section 22 of the BAM Act (DPIRD 2019) and is listed as a Weed of National Significance (WONS) (DotEE 2019d). The majority of these weeds were recorded near moister soils on the valley systems and near creeklines (CW site-vegetation type).

Table 4: Locations of introduced (weed) species in the Larego survey areas

Species	Grid Ref	Site-Vegetation Type	GDA94_Z50H	
			Easting (mE)	Northing (mN)
**Acacia pycnantha*	E5428 1640	W	410252	6355098
**Conzya sumatrensis*	H5423 1604	T	419600	6355705
	E5508 3224	TS	410003	6353669
**Hypochaeris glabra*	E5424 3232	W	410115	6355470
	F5601 3260	TS	411439	6350069
	G5410 4032	TS	415511	6357163
**Lysimachia arvensis*	F5603 2412	CW	412516	6350183
	F5603 4012	CW	412518	6349952
	G5601 4044	CW	414802	6349940
	G5601 4052	CW	414912	6349942
	G5601 2452	CW	414916	6350189
	G5601 3252	CW	414925	6350066
	G5601 1660	CW	415007	6350314
	G5420 3208	CW	416959	6356061
	G5420 4016	CW	417080	6355951
	G5420 4024	CW	417197	6355947
	H5421 0860	CW	418638	6355818
	E5508 3224	TS	410003	6353669
**Phytolacca octandra*	E5508 3224	TS	410003	6353669
**Rubus ulmifolius*	E5504 0840	CW	410241	6354615
**Acacia pycnantha*	E5428 1640	W	410252	6355098

6.2 Vegetation

6.2.1 Vegetation Communities

A total of 17 site-vegetation types were defined and mapped within the Larego survey areas. These units were based on the earlier studies by Havel (1975a and 1975b), and are described in the following text. The representation of the site-vegetation types within the Larego survey areas are summarised in Table 5, Appendix D and the vegetation map (Figures 5.1 to 5.5).

The site-vegetation types PT (11.01%), S (23.25%), T (12.30%) and TS (20.87%) are dominant in the Larego survey areas on the mid and upper slopes, and are typical of the Dwellingup vegetation complex that dominates the sandy-gravel soils on drier slopes, as defined by Heddle *et al.* (1980) and Mattiske and Havel (1998).

Area 1 also supported a series of rehabilitated and cleared areas, see Table 5. All of these site-vegetation types are well represented in the Northern Jarrah Forest, although some occur in localised areas (e.g. R and E) thereby providing a local diversity of inherent flora and vegetation values.

Table 5: Representation of Site-Vegetation Types within the Larego survey areas

Site-Vegetation Types (based on Havel 1975a and 1975b)	Area 1 (Ha)	Area 2 (Ha)	Area 3 (Ha)	Area 4 (Ha)	Total Area (ha)	% Representation
AC	7.24	3.59	3.69	-	14.52	1.09%
C	-	-	3.47	-	3.47	0.26%
CW	16.24	16.81	21.6	11	65.65	4.91%
D	-	-	0.29	-	0.29	0.02%
E	-	-	9.56	-	9.56	0.72%
R	0.91	-	2.01	3.54	6.46	0.48%
P	-	40.87	0	1.12	41.99	3.14%
PS	8.12	20.57	4.87	24.2	57.76	4.32%
PT	5.25	96.7	5.9	39.18	147.03	11.01%
PW	-	-	1.74	-	1.74	0.13%
SP	2.87	22.51	1.15	-	26.53	1.99%
S	64.72	124.23	65.23	56.36	310.54	23.25%
ST	5.3	-	-	3.63	8.93	0.67%
SW	-	0.21	11.73	2.01	13.95	1.04%
T	-	6.64	59.55	98.14	164.33	12.30%
TS	41.64	105.67	35.53	95.93	278.77	20.87%
W	36.67	33.57	18.47	42.88	131.59	9.85%
CL - Cleared	0.62	-	-	-	0.62	0.05%
Rehab	52.35	-	-	-	52.35	3.92%
Total	**241.94**	**471.38**	**244.49**	**377.98**	**1335.79**	**100.00%**

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.

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.

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.

D - Open Forest of *Eucalyptus marginata - Corymbia calophylla – Hakea prostrata* on lower slopes with mixed low understorey species, including *Babingtonia camphorosmae* and *Acacia extensa* on clay loams to gravelly clay-loams.

E - Open Forest to Woodland of *Eucalyptus marginata - Corymbia calophylla* with scattered understorey, including *Kingia australis, Adenanthos barbiger* and low shrubs, herbs and sedges on sandy gravels.

R - Open Woodland of *Eucalyptus marginata - Corymbia calophylla* over low understorey species on fringes of granite outcrops or shallow soils.

P - Open Forest of *Allocasuarina fraseriana - Eucalyptus marginata - Corymbia calophylla* with scattered understorey, including *Adenanthos barbiger* and low shrubs, herbs and sedges on sandy gravels.

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.

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.

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.

SP - Open Forest of *Allocasuarina fraseriana - Eucalyptus marginata - Corymbia calophylla - Banksia grandis* with scattered understorey, including *Adenanthos barbiger* and *Leucopogon capitellatus* on sandy-gravels to gravelly soils.

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.

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.

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.

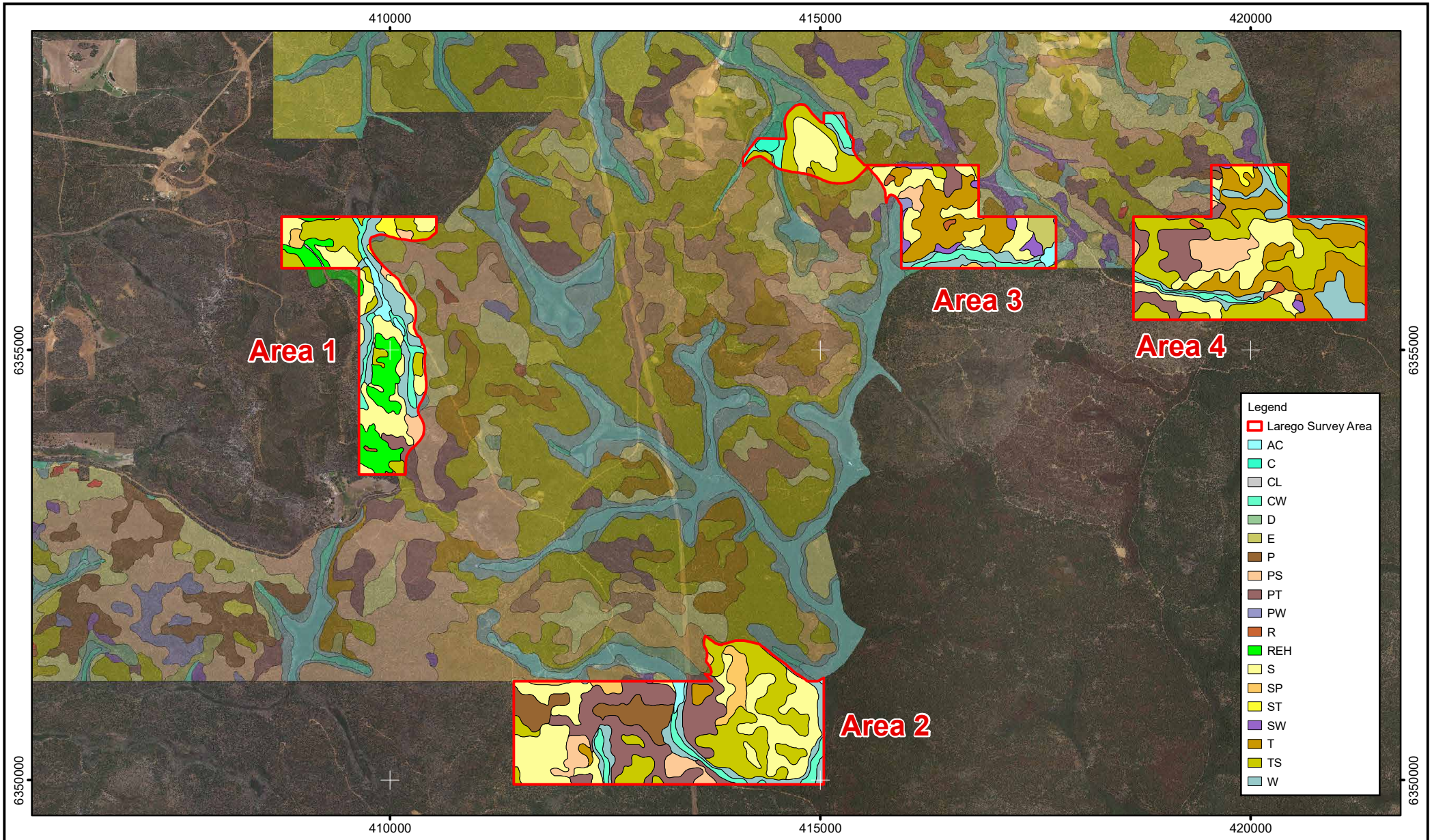
T - Open Forest of *Eucalyptus marginata - Corymbia calophylla* with scattered understorey, including *Leucopogon verticillatus, Pteridium esculentum, Clematis pubescens* and *Bossiaea aquifolium* subsp. *aquifolium* on sandy-loam gravelly soils.

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.

W - Open Forest of *Eucalyptus megacarpa - Eucalyptus patens – Corymbia calophylla* on lower slopes with mixed low understorey species, including *Acacia extensa* and *Hypocalymma angustifolium* on seasonally moister sandy-loam gravelly soils.

6.1.2. Threatened and Priority Ecological Communities

No TECs, pursuant to Schedule 1 of the WC Act and as listed by the DBCA (2019b) were recorded within the Larego survey areas. No PECs as listed by the DBCA (2019b) were recorded within the Larego survey areas.



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Date: July 2019 | Rev: A | A4

Mattiske Consulting Pty Ltd
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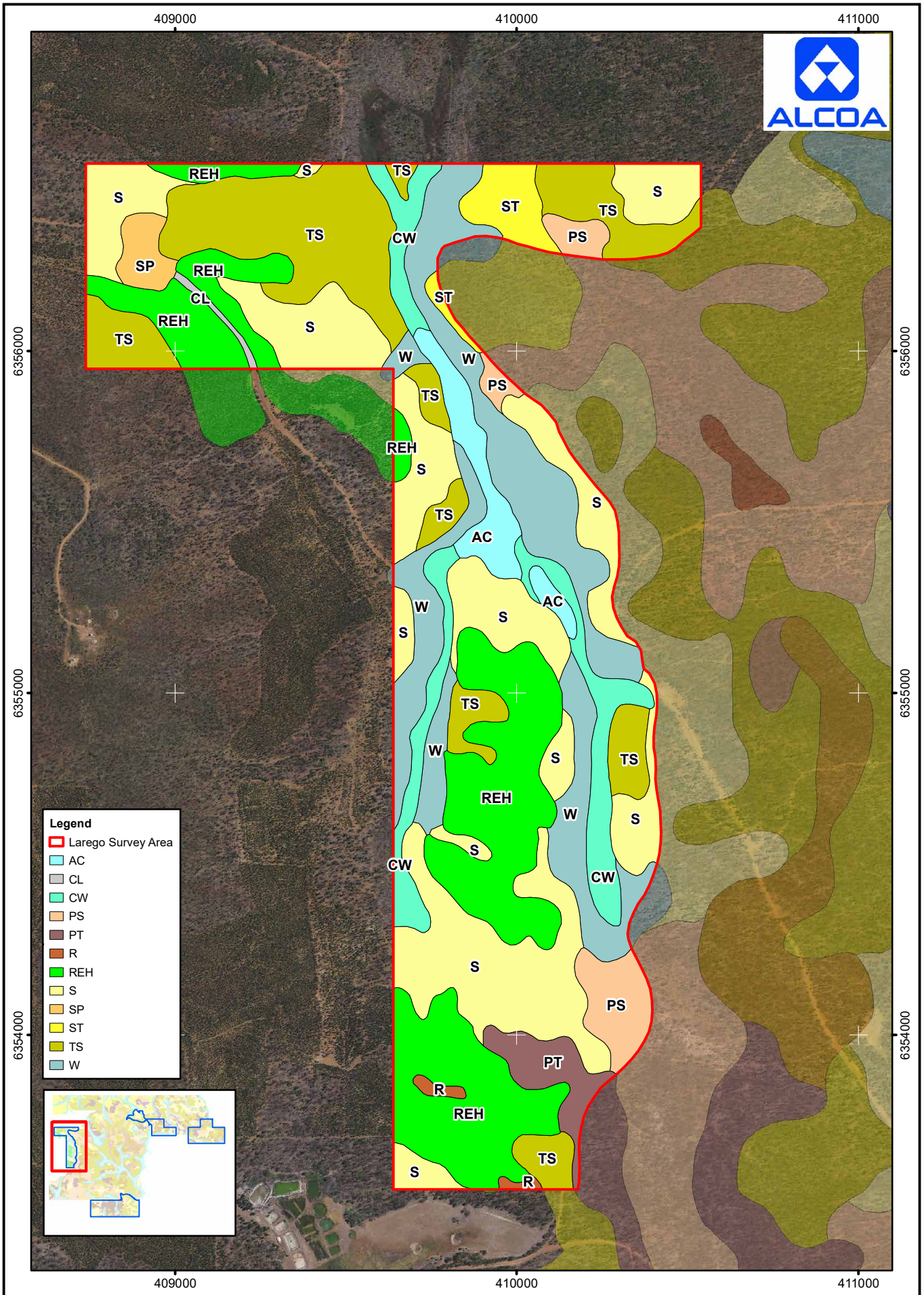
Larego Extension Survey Areas
Vegetation
Survey Areas

Figure: **5.1**



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Date: July 2019 | Rev: A | A4

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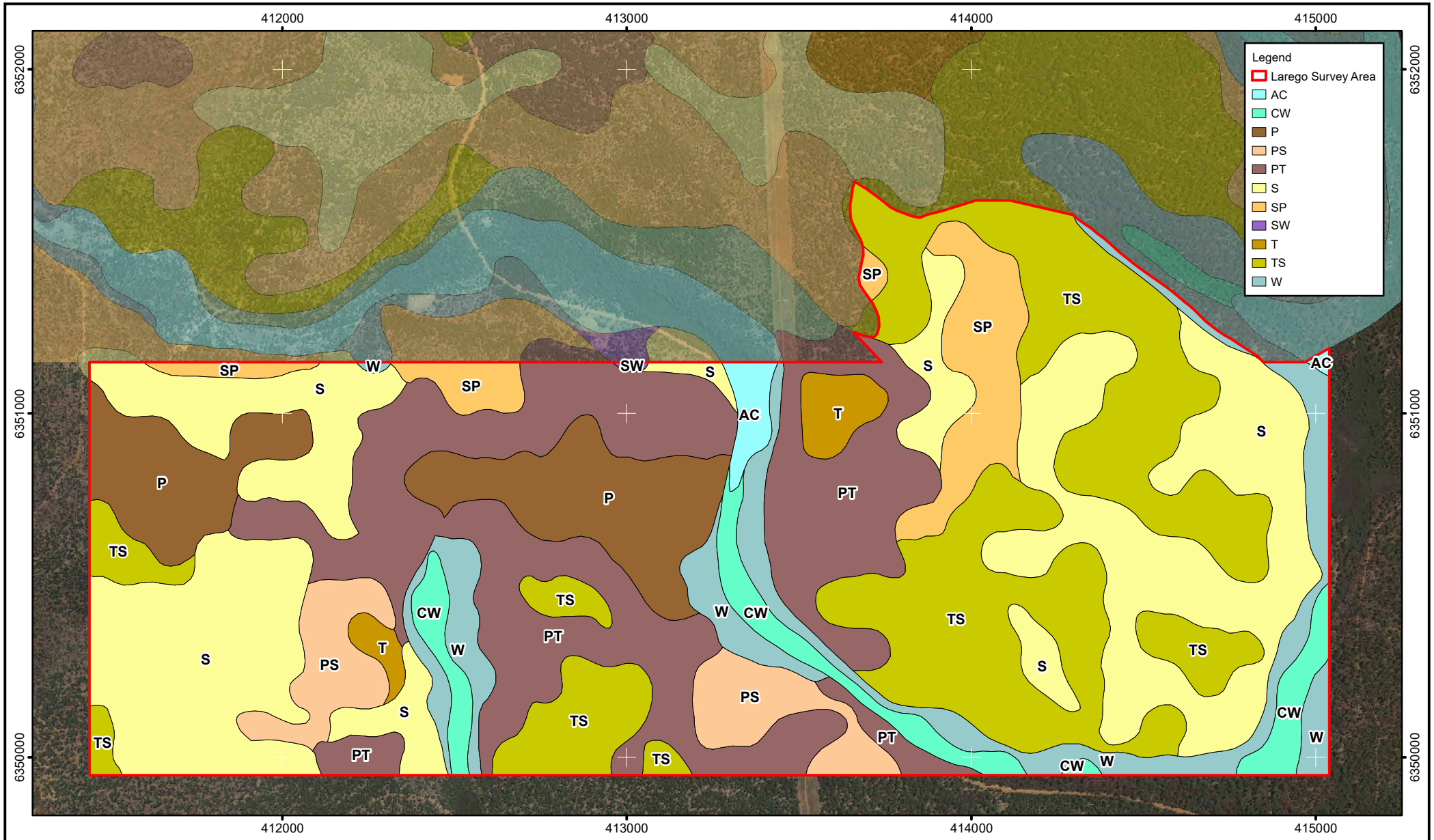
Larego Extension Survey Areas
Vegetation
Area 1

Figure:
5.2



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Sheet Layout:

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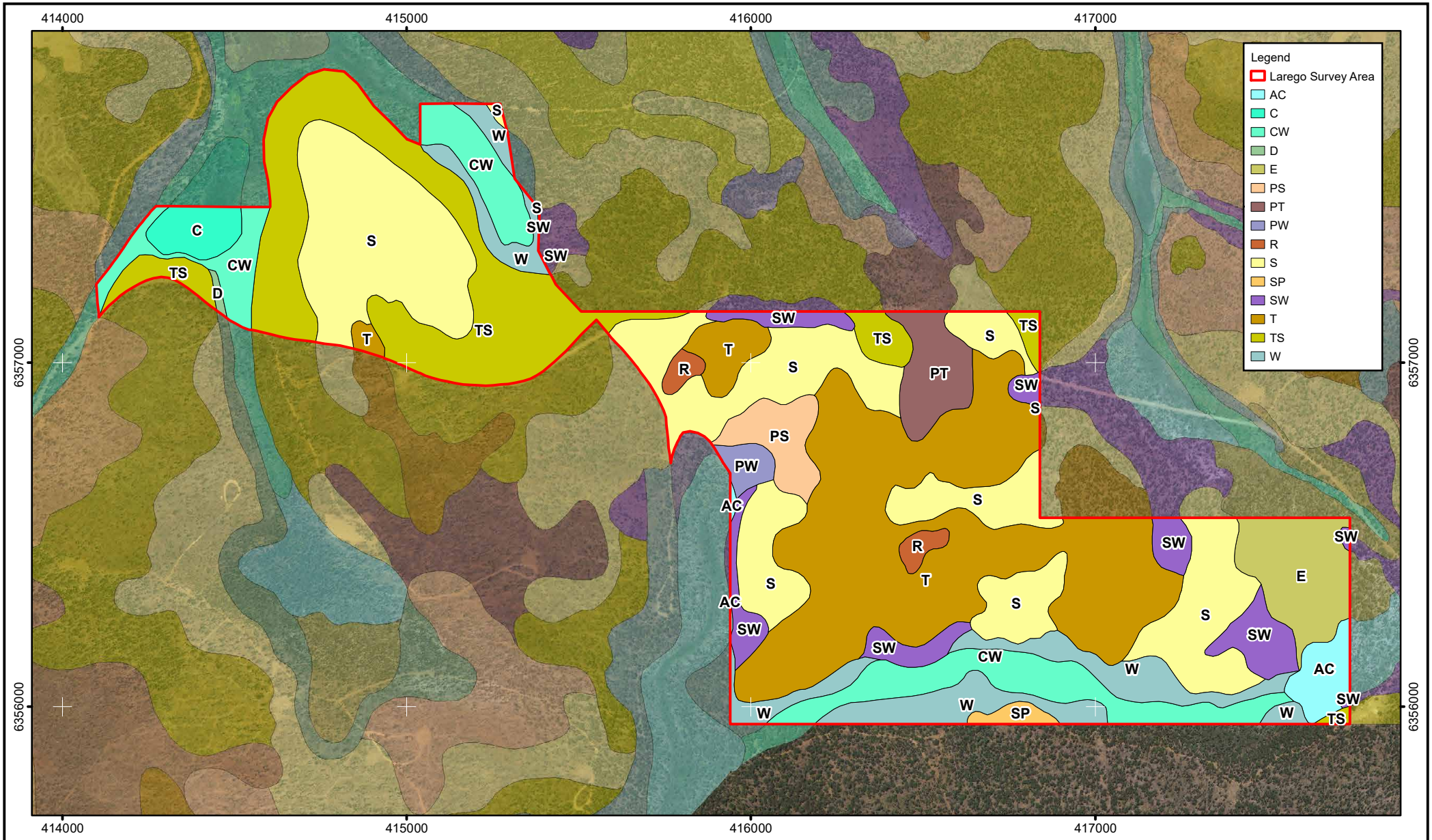
Larego Extension Survey Areas
Vegetation
Area 2

Figure:
5.3



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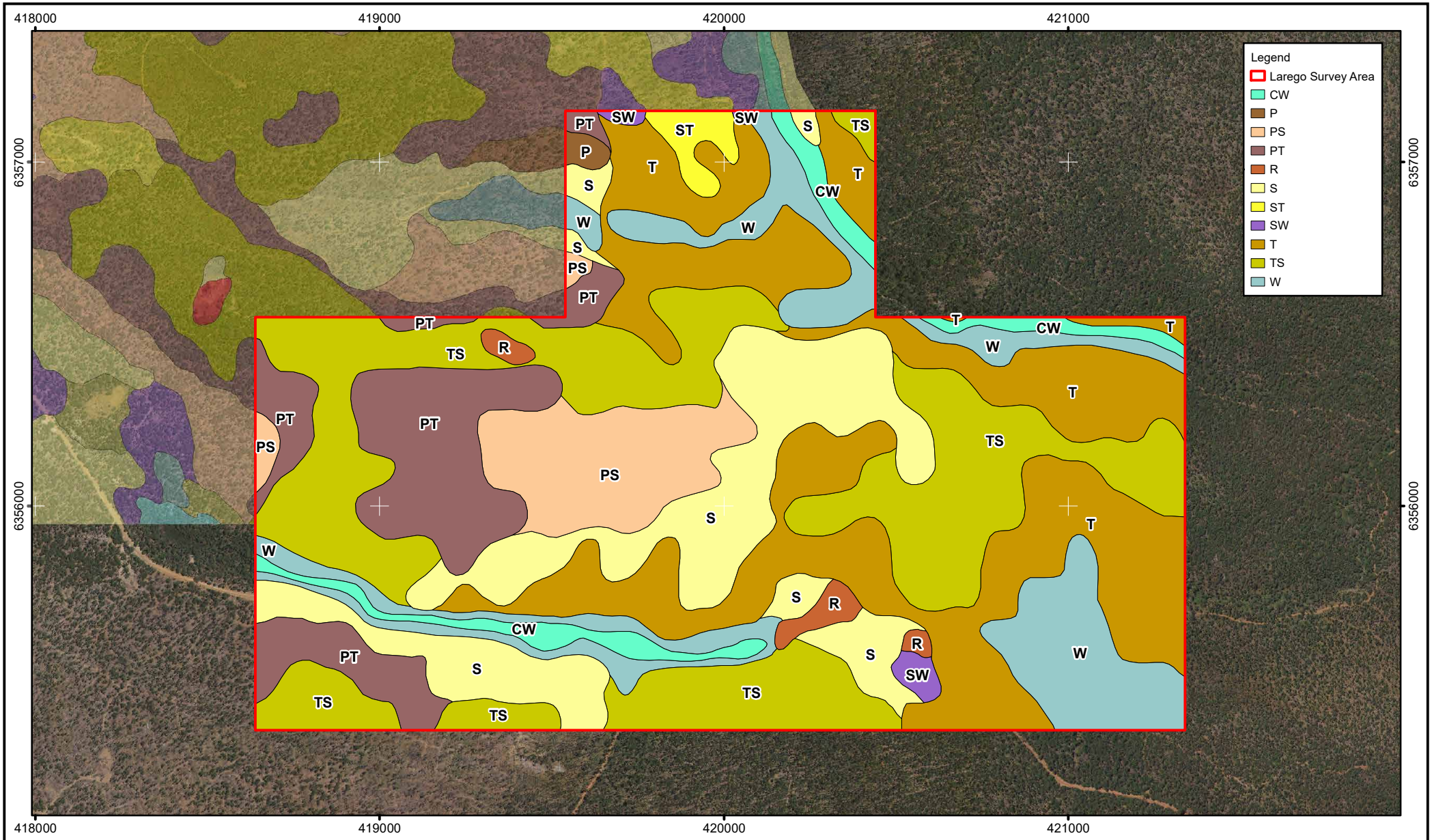
Laregio Extension Survey Areas
Vegetation
Area 3

Figure:
5.4



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Date: July 2019 | Rev: A | A4

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Laregо Extension Survey Areas
Vegetation
Area 4

Figure:
5.5

7. DISCUSSION

The objective of the survey was to assess the flora values and map the vegetation of four Larego areas as extensions to the south and southeast of the Willowdale operations. As indicated above there has been extensive work in the Willowdale area on the baseline flora and vegetation values by E.M. Mattiske and Associates (1993, 1994a, 1994b) and Mattiske Consulting Pty Ltd (1996, 1997 2001, 2012, 2015, 2018).

A general assessment was made of the current survey against a range of factors that may have limited the outcomes and conclusions of this report (Table 7). Based on this assessment, the present survey has not been subject to constraints which would affect the thoroughness of the survey, and the conclusions which have been formed.

Table 7: Potential limitations affecting the conclusions made in this report

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 E.M Mattiske and Associates (1993, 1994a, 1994b); Mattiske Consulting Pty Ltd (1996, 1997, 2001, 2012, 2015 and 2018), with recent field assessments 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 were thoroughly sampled on a 120 m x 120 m grid pattern within the survey area.
Proportion of flora collected and identified (based on sampling, timing and intensity)	**Not a constraint:** The survey areas were sampled on a 120 m x 120 m grid pattern. The proportion of flora collected and identified was considered adequate. The botanists undertaking the field surveys 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.
Completeness and further work which might be needed (was the relevant survey area fully surveyed?)	**Not a constraint:** Vegetation assessment sites were located on a 120 m x 120 m grid pattern within 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 points. There was thorough coverage of the target survey areas.
Mapping reliability	**Not a constraint:** The vegetation was assessed on a 120 m x 120 m grid pattern within the survey area. This together with opportunistic survey sites provided high quality data to enable 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). The current survey was conducted in March to July, outside of this period. However, the site-type vegetation mapping utilised in this report, consistent with previous mapping undertaken on behalf of Alcoa, is based on a range of perennial tree and shrub species. Consequently there is a reduced reliance placed on annual and ephemeral species; although as extensive studies are undertaken in the wider Willowdale area regularly by botanists the latter is not consider a constraint.
Disturbances (fire flood, accidental human intervention, *etc.*)	**Not a constraint:** With the exception of occasional old forestry tracks and snigging formations, the vegetation of the survey area was largely undisturbed. Part of the survey area had been burnt within the last 5 years, however did not impede mapping of the vegetation.
Resources (were there adequate resources to complete the survey to the required standard?)	**Not a constraint:** Resources, in terms of equipment, support and personnel were adequate.
Access problems (*i.e.* ability to access survey area)	**Not a constraint:** Vehicle access to the Larego survey areas assisted in coverage of the areas by assisting access for foot traverses. The survey area was relatively small in size and was easily covered by foot traverses from these tracks.
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.

A total of 242 vascular plant taxa, representative of 109 genera and 49 families, were recorded within the Larego survey areas. The majority of taxa recorded were representative of the Fabaceae (38 taxa), Myrtaceae (22 taxa), Proteaceae (17 taxa) and Asparagaceae (13 taxa) families. The majority of the taxa recorded were widespread both locally and more broadly within the associated biogeographical subregion.

No threatened flora species pursuant to subsection (2) of section 23F of the WC Act and as listed by the DBCA (2019a), or pursuant to section 179 of the EPBC Act or listed by the DotEE (2019c), were recorded within the Larego survey areas.

Three Priority flora species were recorded in the Larego survey areas, including *Lepyrodia curvescens* (P2), *Senecio leucoglossus* (P4) and *Tetratheca pilifera* (P3). The majority of these were either in the creekline areas (site-vegetation type CW) or on the slopes in the site-vegetation types - S, TS, T, Ps and PT. The most dominant Priority species was *Senecio leucoglossus* (P4) which was more common on the slopes and ridges in patchy low numbers. This latter species has been recorded on different surveys and as such is considered to be poorly known rather than threatened.

A total of seven introduced (weed) species were recorded within the Larego survey areas. **Rubus ulmifolius* (forms part of listed aggregate Blackberry species) which is a declared pest organisms pursuant to section 22 of the BAM Act (DPIRD 2019) and is listed as a Weed of National Significance (WONS) (DotEE 2019d). The majority of these weeds were recorded near moister soils on the valley systems and near creeklines (CW site-vegetation type).

No Threatened or Priority Ecological Communities were recorded within the Larego survey areas.

A total of 17 site-vegetation types were defined and mapped within the Larego survey areas. These units were based on the earlier studies by Havel (1975a and 1975b). The site-vegetation types PT (11.01%), S (23.25%), T (12.30%) and TS (20.87%) are dominant in the Larego survey areas on the mid and upper slopes, and are typical of the Dwellingup vegetation complex that dominates the sandy-gravel soils on drier slopes, as defined by Heddle *et al.* (1980) and Mattiske and Havel (1998).

The results reflect several key values, namely:

- The presence of three Priority flora species;
- the occurrence of the R site-vegetation type in association with shallow soils over granite outcrops.
- the occurrence of the E site-vegetation type that occur on the sandier end of the gravels to sand soil continuum.
- the occurrence of the SW and PW site-vegetation types on the seasonally moister soils on lower and mid slopes. These types reflect site conditions that may influence the need to avoid seasonally moister areas during operational activities due to the potential presence of dieback (*Phytophthora cinnamomi*).
- the dominance of the site-vegetation types – PT, S, T and TS on the sandy-gravel and drier mid and upper slopes.

All of these site-vegetation types are well represented in the Northern Jarrah Forest, although some occur in localised areas (e.g. R and E) thereby providing a local diversity of inherent flora and vegetation values.

8. ACKNOWLEDGEMENTS

The authors would like to thank Andrew Richardson and Wayne Baird from Alcoa for their assistance.

9. PERSONNEL

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

NAME	POSITION	PROJECT INVOLVEMENT	FLORA COLLECTION PERMITS
Dr EM Mattiske	Managing Director & Principal Ecologist	Planning, managing, data interpretation, reporting	N/A
Dr S Ruoss	Experienced Ecologist	Fieldwork	SL012276/FB62000031/TFL17-1819
Mr A Barrett	Experienced Botanist	Fieldwork, assisting with reporting	SL012280/FB62000030
Ms E Chetwin	Experienced Botanist	Fieldwork	SL012294/FB62000026
Mr R Dharmarajan	Experienced Botanist	Fieldwork	SL012281/FB62000028
Ms K Lambert	Experienced Botanist	Fieldwork	SL012313/FB62000023
Mr L Rowles	Experienced Botanist	Fieldwork	SL012277/FB62000020
Ms S Yi Zhai	Experienced Biologist	Fieldwork	FB62000029
Mr Z Sims	Experienced Biologist	Fieldwork	FB62000025
Mr B Ellery	Taxonomist	Plant identification	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 likely to become extinct or rare or otherwise in need of special protection in Western Australia under section 19 (1). **Threatened** (or **rare**) **flora** are listed in the *Wildlife Conservation (Rare Flora) Notice 2017* (under section 171 (2) of the *Biodiversity Conservation Regulations 2018;* Department of Biodiversity, Conservation and Attractions 2018a) and are categorised under Schedules 1-4 as Critically endangered, Endangered, Vulnerable or Extinct, respectively (Table A1.2).

Table A1.2 State definition of threatened flora species

Note: Adapted from Department of Biodiversity, Conservation and Attractions (2019a).

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 2017*).
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 2017*).
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 2017*).
EX	**Presumed extinct species**	Species that have been adequately searched for and there is no reasonable doubt that the last individual has died (listed under Schedule 4 of the *Wildlife Conservation (Rare Flora) Notice 2017*).

Priority flora species are defined as "possibly threatened species that do not meet the survey criteria, or are otherwise data deficient; or 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" (Department of Biodiversity, Conservation and Attractions 2017a). **Priority species are not afforded any protection under state or federal legislation**, however are considered significant under the Environmental Protection Authority's *Environmental Factor Guideline: Flora and Vegetation*. The Department of Parks and Wildlife 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 Department of Biodiversity, Conservation and Attractions (2017a).

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.

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 Department of Parks and Wildlife have been identifying and informally listing TECs since 1994. Some of these TECs are endorsed by the Federal Minister as threatened, and some of these are also 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 Department of Environment and Conservation (2013).

CODE	CATEGORY	DEFINITION
PD	**Presumed Totally Destroyed**	An ecological community will be listed as PD if there are no recent records of the community being extant **and either** of the following applies: **1.** Records within the last 50 years have not been confirmed despite thorough searches or known likely habitats; or **2.** All occurrences recorded within the last 50 years have since been destroyed.
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 Department of Parks and Wildlife. 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 Parks and Wildlife 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 Department of Environment and Conservation (2013).

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 2018).

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 B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT WITHIN THE LAREGO EXTENSION AREAS

Refer to Appendix A for State (SCC) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; JAF – Jarrah Forest; SWA – Swan Coastal Plain; WAR – Warren.

Taxon / Common Name	Family	SCC	FCC	Description and Habitat	Potential to Occur in Survey Area
Lasiopetalum pterocarpum	MALVACEAE	T	E	Habit: Open, multi-stemmed shrub (with distinctly winged fruit), to 1.2 m high. Flowers: pink Flowering period: Aug to Dec Soils: Dark red-brown loam or clayey sand over granite. On sloping banks near creeklines. IBRA Distribution: JAF Florabase records: 11	Low Preferred soils potentially present in survey area. Records from further north of survey area.
Anthocercis gracilis	SOLANACEAE	T	V	Habit: Erect, spindly shrub, to 0.6(-1) m high. Flowers: yellow-green Flowering period: Sep to Oct Soils: Sandy or loamy soils. Granite outcrops. IBRA Distribution: AVW, JAF Florabase records: 29	Medium Preferred soils likely to be present in survey area.
Diuris micrantha	ORCHIDACEAE	T	V	Habit: Tuberous, perennial, herb, 0.3-0.6 m high. Flowers: yellow & brown Flowering period: Sep to Oct Soils: Brown loamy clay. Winter-wet swamps, in shallow water. IBRA Distribution: JAF, SWA Florabase records: 6	Low-Medium Preferred soils potentially present in survey area. Few records near the survey area.
Tetraria sp. Nannup (P.A. Jurjevich 1133)	CYPERACEAE	P1	-	Habit: Rhizomatous, perennial sedge to 0.9 m high. Flowers: - Flowering period: - Soils: Muddy clay loam or sand. Seasonally wet low-lying areas, creeks, valley floors. IBRA Distribution: JAF Florabase records: 6	Low-Medium Preferred soils potentially present in survey area. One record near survey area

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT WITHIN THE VAQUITA SURVEY AREA

Refer to Appendix A for State (SCC) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; JAF – Jarrah Forest; SWA – Swan Coastal Plain; WAR – Warren.

Taxon / Common Name	Family	SCC	FCC	Description and Habitat	Potential to Occur in Survey Area
Schizaea rupestris	SCHIZAEACEAE	P2	-	Habit: Rhizomatous, perennial, herb or grass-like (fern), 0.1-0.2 m high, fronds simple, glossy, sporangia-bearing segments in pinnately arrange 'cock's comb'. Flowers: - Flowering period: - Soils: Sand. Gullies, creek banks, shaded moist rock faces. IBRA Distribution: ESP, JAF Florabase records: 13	Low Preferred soils unlikely to be present in survey area. One record near survey area.
Actinotus repens	APIACEAE	P3	-	Habit: prostrate perennial, to 0.05 m high, c. 0.2 m wide. Stems glabrous, robust. Leaves alternate. Flowers: white Flowering period: Jan to Mar Soils: yellow/red/brown clayey loam or sandy loam, wet white sand, black peaty soil. Drainage line, floodplain, valley floor. IBRA Distribution: JAF, WAR Florabase records: 31	Low-Medium Preferred soils potentially present in survey area. Two records near survey area.
Cyathochaeta teretifolia	CYPERACEAE	P3	-	Habit: Rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2 m high, to 1 m wide. Flowers: brown Flowering period: - Soils: Grey sand, sandy clay. Swamps, creek edges. IBRA Distribution: JAF, SWA, WAR Florabase records: 39	High Preferred soils potentially present in survey area. Previously recorded at South Larego.
Grevillea prominens	PROTEACEAE	P3	-	Habit: Spreading shrub, 0.5-1.7 m high, 0.3-1 m wide. Flowers: cream-white Flowering period: Sep to Oct Soils: Gravelly loam. Along creeklines. IBRA Distribution: JAF Florabase records: 9	Medium Preferred soils likely to be present in survey area.

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT WITHIN THE VAQUITA SURVEY AREA

Refer to Appendix A for State (SCC) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; JAF – Jarrah Forest; SWA – Swan Coastal Plain; WAR – Warren.

Taxon / Common Name	Family	SCC	FCC	Description and Habitat	Potential to Occur in Survey Area
Senecio leucoglossus	ASTERACEAE	P4	-	Habit: Erect annual, herb, to 1.3 m high. Flowers: white Flowering period: Aug to Dec Soils: Gravelly lateritic or granitic soils. IBRA Distribution: Granite outcrops, slopes. Florabase records: 41	High Preferred soils likely to be present in survey area. Previously recorded adjacent to survey area.
Stylidium ireneae	STYLIDIACEAE	P4	-	Habit: Lax perennial, herb, (0.06-)0.1-0.28 m high, leaves oblanceolate, 0.4-2 cm long, 1-3(-5) mm wide, apex subacute to acuminate, margin entire, glandular. Flowers: pink Flowering period: Oct to Dec Soils: Sandy loam. Valleys near creek lines. IBRA Distribution: JAF, SWA, WAR Florabase records: 21	Medium Preferred soils potentially present in survey area. Previously recorded at Willowdale.

APPENDIX C: VASCULAR PLANT SPECIES RECORDED WITHIN THE LAREGO EXTENSION AREAS, 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

FAMILY	*	SPECIES
Dennstaedtiaceae		*Pteridium esculentum*
Lindsaeaceae		*Lindsaea linearis*
Zamiaceae		*Macrozamia riedlei*
Poaceae		*Amphipogon amphipogonoides*
		Amphipogon laguroides
		Neurachne alopecuroidea
		Rytidosperma caespitosum
		Tetrarrhena laevis
		Poaceae sp.
Cyperaceae		*Cyathochaeta avenacea*
		Gahnia decomposita
		Lepidosperma squamatum
		Lepidosperma tenue
		Lepidosperma tetraquetrum
		Lepidosperma sp.
		Tetraria capillaris
		Tetraria octandra
		Tetraria sp. Jarrah Forest (R. Davis 7391)
		Cyperaceae sp.
Restionaceae		*Desmocladus fasciculatus*
		Desmocladus flexuosus
		Hypolaena exsulca
		Lepyrodia curvescens (P2)
		Restionaceae sp.
Asparagaceae		*Lomandra sericea*
		Lomandra sonderi
		Lomandra spartea
		Lomandra suaveolens
		Lomandra sp.
		Lomandra sp. 1
		Lomandra sp. 2
		Lomandra sp. 3
		Thysanotus dichotomus
		Thysanotus fastigiatus
		Thysanotus manglesianus
		Thysanotus multiflorus
		Thysanotus thyrsoideus

APPENDIX C: VASCULAR PLANT SPECIES RECORDED WITHIN THE LAREGO EXTENSION AREAS, 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

FAMILY	*	SPECIES
Dasypogonaceae		*Kingia australis*
Xanthorrhoeaceae		*Chamaescilla corymbosa*
		Xanthorrhoea gracilis
		Xanthorrhoea preissii
		Xanthorrhoea sp.
Colchicaceae		*Burchardia congesta*
Boryaceae		*Borya sphaerocephala*
Hemerocallidaceae		*Agrostocrinum hirsutum*
		Dianella revoluta
		Johnsonia lupulina
		Tricoryne sp.
Haemodoraceae		*Conostylis pusilla*
		Conostylis serrulata
		Conostylis setigera
		Conostylis setosa
		Conostylis sp.
		Haemodorum sp.
		Haemodoraceae sp.
Iridaceae		*Patersonia juncea*
		Patersonia occidentalis
		Patersonia pygmaea
		Patersonia rudis
		Patersonia sp.
Orchidaceae		*Microtis media*
		Pterostylis sp.
		Pyrorchis sp.
		Orchidaceae sp.
Casuarinaceae		*Allocasuarina fraseriana*
		Allocasuarina sp.
Proteaceae		*Adenanthos barbiger*
		Banksia dallanneyi subsp*. dallanneyi*
		Banksia grandis
		Banksia littoralis
		Banksia sessilis
		Banksia squarrosa subsp. squarrosa

APPENDIX C: VASCULAR PLANT SPECIES RECORDED WITHIN THE LAREGO EXTENSION AREAS, 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

FAMILY	*	SPECIES
Proteaceae (continued)		*Grevillea bipinnatifida*
		Grevillea diversifolia
		Grevillea manglesii subsp. *manglesii*
		Grevillea pulchella
		Grevillea wilsonii
		Hakea amplexicaulis
		Hakea cyclocarpa
		Hakea lissocarpha
		Hakea ruscifolia
		Persoonia elliptica
		Persoonia longifolia
Phytolaccaceae		*Phytolacca octandra*
Ranunculaceae		*Clematis pubescens*
Lauraceae		*Cassytha* sp.
Droseraceae		*Drosera erythrorhiza*
		Drosera leucoblasta
		Drosera stolonifera
		Drosera sp.
Pittosporaceae		*Billardiera fusiformis*
		Billardiera variifolia
		Billardiera sp.
		Marianthus drummondianus
Rosaceae	*	*Rubus ulmifolius*
Fabaceae		*Acacia divergens*
		Acacia alata
		Acacia browniana
		Acacia celastrifolia
		Acacia drummondii subsp. *candolleana*
		Acacia drummondii subsp. *drummondii*
		Acacia extensa
		Acacia lateriticola
		Acacia myrtifolia
		Acacia nervosa
		Acacia preissiana
		Acacia pulchella
	*	*Acacia pycnantha*
		Acacia urophylla

APPENDIX C: VASCULAR PLANT SPECIES RECORDED WITHIN THE LAREGO EXTENSION AREAS, 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

FAMILY	*	SPECIES
Fabaceae		*Acacia varia v*ar. *varia*
(continued)		*Acacia willdenowiana*
		Bossiaea aquifolium subsp. *aquifolium*
		Bossiaea ornata
		Chorizema cordatum
		Chorizema dicksonii
		Daviesia cordata
		Daviesia decurrens
		Daviesia preissii
		Daviesia sp.
		Gompholobium knightianum
		Gompholobium marginatum
		Gompholobium polymorphum
		Gompholobium preissii
		Gompholobium sp.
		Hovea chorizemifolia
		Hovea trisperma
		Jacksonia furcellata
		Kennedia coccinea
		Kennedia prostrata
		Labichea punctata
		Mirbelia dilatata
		Paraserianthes lophantha
		Sphaerolobium medium
Oxalidaceae		*Oxalis* sp.
Rutaceae		*Asterolasia pallida*
		Boronia crenulata
		Boronia fastigiata
		Boronia molloyae
		Philotheca spicata
Polygalaceae		*Comesperma calymega*
		Comesperma virgatum
Euphorbiaceae		*Monotaxis grandiflora*
		Monotaxis occidentalis
Phyllanthaceae		*Phyllanthus calycinus*
Celastraceae		*Stackhousia monogyna*
		Stackhousia sp.

APPENDIX C: VASCULAR PLANT SPECIES RECORDED WITHIN THE LAREGO EXTENSION AREAS, 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

FAMILY	*	SPECIES
Sapindaceae		*Dodonaea* sp.
Rhamnaceae		*Trymalium ledifolium*
		Trymalium odoratissimum subsp. *odoratissimum*
Elaeocarpaceae		*Tetratheca hirsuta*
		Tetratheca ?pilifera (P3)
		Tetratheca sp.
Malvaceae		*Lasiopetalum floribundum*
		Lasiopetalum glabratum
		Lasiopetalum sp.
		Thomasia ?macrocalyx
		Thomasia paniculata
Dilleniaceae		*Hibbertia acerosa*
		Hibbertia amplexicaulis
		Hibbertia commutata
		Hibbertia hypericoides
		Hibbertia ovata
		Hibbertia perfoliata
		Hibbertia silvestris
		Hibbertia sp.
Thymelaeaceae		*Pimelea suaveolens*
		Pimelea sp.
Myrtaceae		*Astartea scoparia*
		Babingtonia camphorosmae
		Calothamnus sp.
		Calytrix leschenaultii
		Calytrix sp.
		Corymbia calophylla
		Eucalyptus marginata
		Eucalyptus megacarpa
		Eucalyptus patens
		Eucalyptus rudis
		Eucalyptus sp.
		Hypocalymma angustifolium
		Hypocalymma cordifolium
		Hypocalymma robustum
		Hypocalymma sp.
		Leptospermum erubescens
		Melaleuca preissiana

APPENDIX C: VASCULAR PLANT SPECIES RECORDED WITHIN THE LAREGO EXTENSION AREAS, 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

FAMILY	*	SPECIES
Myrtaceae (continued)		*Melaleuca ?trichophylla*
		Melaleuca sp.
		Pericalymma ellipticum
		Taxandria linearifolia
		Myrtaceae sp.
Haloragaceae		*Glischrocaryon aureum*
		Gonocarpus benthamii
Araliaceae		*Trachymene pilosa*
Apiaceae		*Pentapeltis peltigera*
		Pentapeltis silvatica
		Platysace compressa
		Platysace filiformis
		Platysace tenuissima
		Xanthosia candida
		Xanthosia ciliata
		Xanthosia huegelii
		Xanthosia sp.
Ericaceae		*Andersonia* sp.
		Astroloma ciliatum
		Astroloma pallidum
		Astroloma sp.
		Leucopogon capitellatus
		Leucopogon concinnus
		Leucopogon nutans
		Leucopogon propinquus
		Leucopogon verticillatus
		Leucopogon sp.
		Styphelia tenuiflora
Primulaceae	*	*Lysimachia arvensis*
Lamiaceae		*Hemigenia pritzelii*
		Lamiaceae sp.
Orobanchaceae	*	*Orobanche minor*
Rubiaceae		*Opercularia echinocephala*
		Opercularia vaginata
		Opercularia sp.

APPENDIX C: VASCULAR PLANT SPECIES RECORDED WITHIN THE LAREGO EXTENSION AREAS, 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

FAMILY	*	SPECIES
Campanulaceae		*Lobelia gibbosa*
Goodeniaceae		*Dampiera hederacea*
		Lechenaultia biloba
		Scaevola calliptera
		Scaevola sp.
Stylidiaceae		*Stylidium amoenum*
		Stylidium brunonianum
		Stylidium ciliatum
		Stylidium piliferum
		Stylidium repens
		Stylidium sp.
		Stylidium sp. 2
Asteraceae	*	*Conzya sumatrensis*
	*	*Hypochaeris glabra*
		Lagenophora huegelii
		Olearia paucidentata
		Pterochaeta paniculata
		Senecio diaschides
		Senecio leucoglossus (P4)
		Senecio quadridentatus
		Senecio sp.
		Trichocline spathulata
		Asteraceae sp.

APPENDIX D: VASCULAR PLANT SPECIES RECORDED BY SITE-VEGETATION TYPE WITHIN THE LAREGO EXTENSION AREAS , 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

		Site-Vegetation Types																
	SPECIES	**T**	**TS**	**W**	**C**	**CW**	**AC**	**E**	**PW**	**D**	**P**	**PS**	**PT**	**SP**	**S**	**SW**	**ST**	**R**	**REH**
	Acacia alata	x	x	x	x	x							x		x	x	x	x	
	Acacia browniana	x	x		x	x	x								x				
	Acacia celastrifolia		x	x									x	x	x				x
	Acacia divergens		x	x	x	x	x								x			x	
	Acacia drummondii subsp. *candolleana*	x	x	x		x		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						x	x	x			x
	Acacia lateriticola	x	x	x		x	x	x						x	x		x		x
	Acacia myrtifolia					x													
	Acacia nervosa																		x
	Acacia preissiana	x																	
	Acacia pulchella	x	x	x	x	x		x			x	x	x	x	x	x	x	x	x
*	*Acacia pycnantha*			x															
	Acacia urophylla	x	x	x		x		x							x		x		x
	Acacia varia var. *varia*			x									x		x				
	Acacia willdenowiana											x	x		x				
	Adenanthos barbiger	x	x					x				x	x	x	x	x	x	x	
	Agrostocrinum hirsutum														x				
	Allocasuarina fraseriana	x	x	x		x			x	x	x	x	x	x	x	x	x		x
	Allocasuarina sp.														x				
	Amphipogon amphipogonoides		x	x							x	x			x				
	Amphipogon laguroides					x													
	Andersonia sp.														x				x
	Apiaceae sp.	x																	
	Astartea scoparia				x	x						x							
	Asteraceae sp.		x											x	x				
	Asterolasia pallida	x		x	x	x									x				
	Astroloma ciliatum	x	x	x							x	x	x	x	x	x	x	x	
	Astroloma pallidum	x	x								x	x	x		x		x		
	Astroloma sp.			x											x				

APPENDIX D: VASCULAR PLANT SPECIES RECORDED BY SITE-VEGETATION TYPE WITHIN THE LAREGO EXTENSION AREAS , 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

	Site-Vegetation Types																	
SPECIES	**T**	**TS**	**W**	**C**	**CW**	**AC**	**E**	**PW**	**D**	**P**	**PS**	**PT**	**SP**	**S**	**SW**	**ST**	**R**	**REH**
Babingtonia camphorosmae			x	x	x										x			
Banksia dallanneyi subsp. *dallanneyi*	x	x	x		x		x		x	x	x	x	x	x	x	x	x	
Banksia grandis	x	x	x							x	x	x	x	x		x	x	
Banksia littoralis			x	x	x		x											
Banksia sessilis										x	x			x				
Banksia squarrosa subsp. *squarrosa*														x				
Billardiera fusiformis		x	x		x						x			x		x		x
Billardiera sp.	x	x	x		x									x		x		x
Billardiera variifolia	x	x	x		x						x			x			x	x
Boronia crenulata		x												x				
Boronia fastigiata	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x	x
Boronia molloyae														x				
Borya sphaerocephala																x		
Bossiaea aquifolium subsp. *aquifolium*	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Bossiaea ornata	x	x	x				x			x		x	x	x		x		x
Burchardia congesta		x	x											x				
Calothamnus sp.		x																
Calytrix leschenaultii										x	x	x	x	x				
Calytrix sp.	x							x		x	x	x		x		x		
Cassytha sp.	x	x	x	x	x	x								x				
Chamaescilla corymbosa														x				
Chorizema cordatum	x	x	x	x	x						x	x		x	x	x		x
Chorizema dicksonii			x															
Clematis pubescens	x	x	x	x	x						x	x	x	x		x		
Comesperma calymega		x																
Comesperma virgatum		x			x						x			x				
Conostylis pusilla														x				
Conostylis serrulata			x							x	x	x		x				
Conostylis setigera	x	x	x							x	x	x	x	x	x	x		
Conostylis setosa			x											x				

APPENDIX D: VASCULAR PLANT SPECIES RECORDED BY SITE-VEGETATION TYPE WITHIN THE LAREGO EXTENSION AREAS , 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

		Site-Vegetation Types																
	SPECIES	**T**	**TS**	**W**	**C**	**CW**	**AC**	**E**	**PW**	**D**	**P**	**PS**	**PT**	**SP**	**S**	**SW**	**ST**	**R**	**REH**
	Conostylis sp.										x				x			x	
*	*Conzya sumatrensis*	x	x																
	Corymbia calophylla	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
	Cyathochaeta avenacea	x	x	x	x	x						x	x		x	x			
	Cyperaceae sp.														x				
	Dampiera hederacea			x	x	x	x											x	
	Daviesia cordata	x																	
	Daviesia decurrens					x						x	x		x				
	Daviesia preissii														x				
	Daviesia sp.														x				
	Desmocladus fasciculatus			x	x	x													
	Desmocladus flexuosus	x	x	x	x	x									x				
	Dianella revoluta														x				
	Dodonaea sp.					x						x							
	Drosera erythrorhiza														x				
	Drosera leucoblasta					x													
	Drosera sp.	x	x	x							x	x	x		x				
	Drosera stolonifera												x						
	Eucalyptus marginata	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Eucalyptus megacarpa		x	x		x	x		x				x						
	Eucalyptus patens	x	x	x	x	x	x			x			x					x	x
	Eucalyptus rudis				x	x													
	Eucalyptus sp.					x													
	Gahnia decomposita			x	x	x	x	x											
	Glischrocaryon aureum	x	x	x							x	x	x		x				
	Gompholobium knightianum													x	x				x
	Gompholobium marginatum			x											x				x
	Gompholobium polymorphum			x															
	Gompholobium preissii		x	x											x				x

APPENDIX D: VASCULAR PLANT SPECIES RECORDED BY SITE-VEGETATION TYPE WITHIN THE LAREGO EXTENSION AREAS , 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

	Site-Vegetation Types																	
SPECIES	**T**	**TS**	**W**	**C**	**CW**	**AC**	**E**	**PW**	**D**	**P**	**PS**	**PT**	**SP**	**S**	**SW**	**ST**	**R**	**REH**
Gompholobium sp.				x	x													
Gonocarpus benthamii			x															
Grevillea bipinnatifida		x																
Grevillea diversifolia		x									x	x						
Grevillea manglesii subsp. *manglesii*		x																
Grevillea pulchella	x		x	x	x						x			x		x	x	
Grevillea wilsonii		x	x				x						x	x		x	x	x
Haemodoraceae sp.													x					
Haemodorum sp.										x				x				
Hakea amplexicaulis	x	x	x		x					x	x	x	x	x		x	x	x
Hakea cyclocarpa														x				
Hakea lissocarpha	x	x			x					x	x			x	x	x		
Hakea ruscifolia														x				
Hemigenia pritzelii	x	x	x	x	x					x	x	x	x	x	x	x	x	x
Hibbertia acerosa			x															x
Hibbertia amplexicaulis	x	x	x		x				x	x	x	x	x	x	x	x	x	
Hibbertia commutata	x	x							x	x	x	x	x	x		x		
Hibbertia hypericoides	x	x										x						
Hibbertia ovata	x	x										x		x	x	x	x	
Hibbertia perfoliata	x	x	x				x			x	x	x	x	x	x		x	
Hibbertia silvestris		x												x				
Hibbertia sp.	x	x	x		x		x		x	x	x	x	x	x	x	x	x	
Hovea chorizemifolia		x																
Hovea chorizemifolia	x	x	x	x	x				x	x	x	x	x	x		x		x
Hovea trisperma		x	x									x						
Hypocalymma angustifolium	x		x	x	x		x	x						x	x	x		
Hypocalymma cordifolium	x		x	x	x	x												
Hypocalymma robustum				x	x													
Hypocalymma sp.			x				x							x				
* *Hypochaeris glabra*		x	x															

APPENDIX D: VASCULAR PLANT SPECIES RECORDED BY SITE-VEGETATION TYPE WITHIN THE LAREGO EXTENSION AREAS , 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

	Site-Vegetation Types																	
SPECIES	**T**	**TS**	**W**	**C**	**CW**	**AC**	**E**	**PW**	**D**	**P**	**PS**	**PT**	**SP**	**S**	**SW**	**ST**	**R**	**REH**
Hypolaena exsulca										x				x				
Jacksonia furcellata			x		x		x											
Johnsonia lupulina														x				
Kennedia coccinea	x	x	x											x		x		x
Kennedia prostrata	x													x				x
Kingia australis			x				x							x				
Labichea punctata	x	x			x						x	x		x				
Lagenophora huegelii	x	x	x	x	x				x	x	x	x	x	x		x		
Lamiaceae sp.														x				
Lasiopetalum floribundum	x	x	x		x	x				x	x	x	x	x	x	x	x	x
Lasiopetalum glabratum		x	x															
Lasiopetalum sp.						x												
Laxmannia sp.														x				
Lechenaultia biloba	x	x	x						x	x	x	x	x	x	x	x	x	
Lepidosperma sp.			x									x		x				
Lepidosperma squamatum		x	x	x	x	x				x	x			x				
Lepidosperma tenue	x									x	x							
Lepidosperma tetraquetrum		x	x	x	x										x			
Leptospermum erubescens			x								x			x				
Lepyrodia curvescens (P2)					x													
Leucopogon capitellatus	x	x	x						x		x	x		x	x		x	
Leucopogon concinnus											x							
Leucopogon nutans																x		
Leucopogon propinquus	x	x	x							x	x	x	x	x	x	x	x	
Leucopogon sp.		x									x			x				
Leucopogon verticillatus	x	x	x		x						x	x	x	x	x	x	x	
Lindsaea linearis			x	x	x		x				x			x				
Lobelia gibbosa		x					x											
Lomandra ?integra		x									x	x		x				
Lomandra caespitosa		x	x	x	x		x				x	x	x	x	x	x		

APPENDIX D: VASCULAR PLANT SPECIES RECORDED BY SITE-VEGETATION TYPE WITHIN THE LAREGO EXTENSION AREAS , 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

		Site-Vegetation Types																
	SPECIES	**T**	**TS**	**W**	**C**	**CW**	**AC**	**E**	**PW**	**D**	**P**	**PS**	**PT**	**SP**	**S**	**SW**	**ST**	**R**	**REH**
	Lomandra drummondii		x									x	x	x	x		x		
	Lomandra hermaphrodita	x	x	x	x	x					x	x	x	x	x	x	x	x	x
	Lomandra micrantha subsp. micrantha	x	x											x	x		x		
	Lomandra nigricans														x				
	Lomandra preissii	x	x								x		x	x	x				
	Lomandra purpurea	x	x	x	x	x								x	x				
	Lomandra sericea	x	x	x	x	x					x	x	x	x	x	x	x	x	x
	Lomandra sonderi	x	x	x	x	x		x		x		x	x	x	x	x	x	x	
	Lomandra sp.	x	x	x	x	x		x	x		x	x	x	x	x	x	x	x	
	Lomandra sp. 1	x	x								x	x	x	x	x		x		
	Lomandra sp. 2	x	x								x		x						
	Lomandra sp. 3												x						
	Lomandra spartea		x								x	x		x	x		x		
	Lomandra suaveolens										x								
*	*Lysimachia arvensis*		x		x	x													
	Macrozamia riedlei	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Marianthus drummondianus		x										x						
	Melaleuca ?trichophylla			x															
	Melaleuca preissiana				x	x		x											
	Melaleuca sp.				x	x													
	Microtis media														x				
	Mirbelia dilatata	x	x	x	x	x	x					x	x	x	x	x	x		x
	Monotaxis grandiflora														x				
	Monotaxis occidentalis	x	x	x	x	x	x				x	x	x		x		x		x
	Myrtaceae sp.		x		x	x		x	x			x		x	x	x		x	
	Neurachne alopecuroidea	x	x	x								x	x		x		x		
	Olearia paucidentata														x				
	Opercularia echinocephala	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
	Opercularia sp.		x	x															
	Opercularia vaginata												x						

APPENDIX D: VASCULAR PLANT SPECIES RECORDED BY SITE-VEGETATION TYPE WITHIN THE LAREGO EXTENSION AREAS , 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

		Site-Vegetation Types																
	SPECIES	**T**	**TS**	**W**	**C**	**CW**	**AC**	**E**	**PW**	**D**	**P**	**PS**	**PT**	**SP**	**S**	**SW**	**ST**	**R**	**REH**
	Orchidaceae sp.														x				
*	*Orobanche minor*											x							
	Oxalis sp.	x	x																
	Paraserianthes lophantha	x	x	x	x	x			x			x		x	x	x			x
	Patersonia juncea										x				x				
	Patersonia occidentalis		x	x				x				x			x	x			
	Patersonia pygmaea											x			x				
	Patersonia rudis														x				
	Patersonia sp.		x																
	Pentapeltis peltigera	x	x	x				x				x	x		x	x	x		
	Pentapeltis silvatica		x	x								x	x				x		
	Pericalymma ellipticum			x							x	x			x				
	Persoonia elliptica		x	x								x	x		x				
	Persoonia longifolia	x	x	x		x		x		x	x	x	x	x	x	x	x	x	
	Philotheca spicata		x	x	x	x		x				x	x		x	x	x		
	Phyllanthus calycinus	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x	x
*	*Phytolacca octandra*		x																
	Pimelea sp.	x	x	x	x	x					x	x	x		x		x	x	
	Pimelea suaveolens			x						x					x		x		
	Platysace compressa	x	x	x	x	x		x	x		x	x	x	x	x	x	x	x	x
	Platysace filiformis				x	x													
	Platysace tenuissima		x												x				
	Poaceae sp.	x	x								x				x				
	Pteridium esculentum	x	x	x	x	x	x	x				x	x	x	x		x	x	
	Pterochaeta paniculata								x			x	x		x		x		
	Pterostylis sp.	x	x	x							x	x	x	x	x				
	Pyrorchis sp.	x	x										x						
	Restionaceae sp.	x													x				
*	*Rubus ulmifolius*					x													
	Rytidosperma caespitosum	x	x	x	x	x							x		x	x	x		x

APPENDIX D: VASCULAR PLANT SPECIES RECORDED BY SITE-VEGETATION TYPE WITHIN THE LAREGO EXTENSION AREAS , 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

	Site-Vegetation Types																	
SPECIES	**T**	**TS**	**W**	**C**	**CW**	**AC**	**E**	**PW**	**D**	**P**	**PS**	**PT**	**SP**	**S**	**SW**	**ST**	**R**	**REH**
Scaevola calliptera	x	x												x		x		
Scaevola sp.																	x	
Senecio diaschides		x	x	x	x							x	x					
Senecio leucoglossus (P4)	x	x			x						x	x		x				
Senecio quadridentatus	x	x																
Senecio sp.	x	x	x	x	x					x	x	x	x	x		x	x	
Sphaerolobium medium											x			x				
Stackhousia monogyna																	x	
Stackhousia sp.		x												x				
Stylidium amoenum	x	x	x	x	x					x	x	x	x	x	x	x	x	x
Stylidium brunonianum	x																	
Stylidium ciliatum		x						x			x			x				
Stylidium piliferum		x	x						x	x	x	x	x	x		x		
Stylidium repens			x				x											
Stylidium sp.	x	x	x		x		x			x	x	x		x		x		
Stylidium sp. 2										x	x							
Styphelia tenuiflora		x										x		x	x			
Taxandria linearifolia			x	x	x	x												
Tetraria capillaris	x	x	x		x	x		x	x	x	x	x	x	x		x	x	
Tetraria octandra	x	x	x								x			x				
Tetraria sp. Jarrah Forest (R. Davis 7391)	x	x	x	x	x		x			x	x	x		x			x	
Tetrarrhena laevis	x	x	x	x	x					x	x	x	x	x	x	x		
Tetratheca ?pilifera (P3)														x				
Tetratheca hirsuta		x	x								x	x	x	x			x	
Tetratheca sp.	x	x									x	x	x	x				
Thomasia ?macrocalyx		x	x	x	x													
Thomasia paniculata			x	x	x	x												
Thysanotus dichotomus		x	x									x		x	x	x	x	
Thysanotus fastigiatus		x	x	x	x						x	x		x				x
Thysanotus manglesianus												x						

APPENDIX D: VASCULAR PLANT SPECIES RECORDED BY SITE-VEGETATION TYPE WITHIN THE LAREGO EXTENSION AREAS , 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)

	Site-Vegetation Types																	
SPECIES	**T**	**TS**	**W**	**C**	**CW**	**AC**	**E**	**PW**	**D**	**P**	**PS**	**PT**	**SP**	**S**	**SW**	**ST**	**R**	**REH**
Thysanotus multiflorus	x	x	x	x	x					x	x	x	x	x	x	x	x	x
Thysanotus thyrsoideus	x		x									x						
Trachymene pilosa	x	x												x				
Trichocline spathulata	x	x							x		x	x		x				
Tricoryne sp.	x		x							x		x						
Trymalium ledifolium	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
Trymalium odoratissimum subsp. *odoratissimum*	x	x	x	x	x						x		x	x	x	x	x	
Xanthorrhoea gracilis	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x	x
Xanthorrhoea preissii	x	x	x	x	x		x			x	x	x	x	x	x	x	x	
Xanthorrhoea sp.																x		
Xanthosia candida	x	x	x											x	x	x		x
Xanthosia ciliata														x				
Xanthosia huegelii		x												x		x		
Xanthosia sp.												x						

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 07/02/2019

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 116° 05' 27" E,32° 56' 24" S
Buffer 10km

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1.	15429	*Acacia alata var. alata*			
2.	3247	*Acacia browniana*			
3.	3307	*Acacia divergens*			
4.	11303	*Acacia drummondii subsp. candolleana*			
5.	3331	*Acacia extensa (Wiry Wattle)*			
6.	15487	*Acacia varia var. varia*			
7.	6203	*Actinotus glomeratus*			
8.	6205	*Actinotus leucocephalus (Flannel Flower)*			
9.	44007	*Actinotus repens*		P3	
10.	1791	*Adenanthos obovatus (Basket Flower)*			
11.	1728	*Allocasuarina fraseriana (Sheoak, Kondil)*			
12.	13101	*Amperea simulans*			
13.	198	*Amphipogon laguroides*			
14.	6300	*Andersonia aristata (Rice Flower)*			
15.	1116	*Aphelia brizula*			
16.	20283	*Astartea scoparia (Common Astartea)*			
17.	4400	*Asterolasia pallida*			
18.	6323	*Astroloma ciliatum (Candle Cranberry)*			
19.	32616	*Banksia dallanneyi subsp. sylvestris*			
20.	32577	*Banksia dallanneyi var. mellicula*			
21.	1819	*Banksia grandis (Bull Banksia, Pulgarla)*			
22.	1848	*Banksia seminuda (River Banksia)*			
23.	32315	*Barbula calycina*			
24.	748	*Baumea vaginalis (Sheath Twigrush)*			
25.	3157	*Billardiera floribunda (White-flowered Billardiera)*			
26.	3165	*Billardiera variifolia*			
27.	4413	*Boronia crenulata (Aniseed Boronia)*			
28.	16636	*Boronia crenulata subsp. viminea*			
29.	4420	*Boronia fastigiata (Bushy Boronia)*			
30.	4429	*Boronia molloyae (Tall Boronia)*			
31.	48782	*Bossiaea angustifolia*			
32.	14396	*Bossiaea aquifolium subsp. aquifolium*			
33.	12770	*Burchardia congesta*			
34.	1276	*Caesia micrantha (Pale Grass Lily)*			
35.	48988	*Callistemon citrinus*	Y		
36.	5450	*Calytrix depressa*			
37.	32461	*Campylopus bicolor var. bicolor*			
38.	32338	*Campylopus introflexus*	Y		
39.	11501	*Cassytha glabella forma casuarinae*			
40.	2956	*Cassytha pomiformis (Dodder Laurel)*			
41.	1128	*Centrolepis fascicularis*			
42.		*Cephaloziella exiliflora*			
43.		*Cephaloziella varians*			
44.	11299	*Chamaescilla corymbosa var. corymbosa*			
45.		*Chiloscyphus semiteres var. semiteres*			
46.	8971	*Chorizema cordatum*			
47.	3761	*Chorizema rhombeum*			
48.	2929	*Clematis pubescens (Common Clematis)*			
49.	4551	*Comesperma ciliatum*			
50.	16853	*Conospermum capitatum subsp. glabratum*			
51.	1872	*Conospermum flexuosum (Tangled Smokebush)*			
52.	16850	*Conospermum flexuosum subsp. laevigatum*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
53.	1453	*Conostylis serrulata*			
54.	11597	*Conostylis setigera subsp. setigera*			
55.	17104	*Corymbia calophylla (Marri)*			
56.	7943	*Cotula australis (Common Cotula)*			
57.	7945	*Cotula coronopifolia (Waterbuttons)*	Y		
58.	3139	*Crassula exserta*			
59.	1627	*Cryptostylis ovata (Slipper Orchid)*			
60.	768	*Cyathochaeta avenacea*			
61.	16245	*Cyathochaeta teretifolia*		P3	
62.	7420	*Dampiera alata (Winged-stem Dampiera)*			
63.	7444	*Dampiera hederacea (Karri Dampiera)*			
64.	3800	*Daviesia costata*			
65.	11636	*Dianella revoluta var. divaricata*			
66.	32344	*Dicranoloma diaphanoneuron*			
67.	3118	*Drosera pallida (Pale Rainbow)*			
68.	3124	*Drosera pulchella (Pretty Sundew)*			
69.	8913	*Drosera squamosa*			
70.	15412	*Eriochilus dilatatus subsp. multiflorus*			
71.	13547	*Eucalyptus marginata subsp. marginata (Jarrah)*			
72.	5709	*Eucalyptus megacarpa (Bullich, Pulidj)*			
73.	18602	*Eucalyptus microcorys*	Y		
74.	5739	*Eucalyptus patens (Swan River Blackbutt, Dwuda)*			
75.	48210	*Eucalyptus saligna*	Y		
76.	32756	*Eutaxia exilis*			
77.	902	*Gahnia decomposita*			
78.	907	*Gahnia trifida (Coast Saw-sedge)*			
79.	7323	*Galium murale (Small Goosegrass)*	Y		
80.	3891	*Gastrolobium bilobum (Heart Leaf Poison)*			
81.	14202	*Gastrolobium glabratum*			
82.	6146	*Gonocarpus benthamii*			
83.	6150	*Gonocarpus diffusus*			
84.	14282	*Gratiola pubescens*			
85.	14417	*Grevillea prominens*		P3	
86.	2080	*Grevillea quercifolia (Oak-leaf Grevillea)*			
87.	2101	*Grevillea synapheae (Catkin Grevillea)*			
88.	2128	*Hakea amplexicaulis (Prickly Hakea)*			
89.	2170	*Hakea lasianthoides*			
90.	2203	*Hakea ruscifolia (Candle Hakea)*			
91.	32391	*Hedwigia ciliata*			
92.	6866	*Hemigenia pritzelii*			
93.	5109	*Hibbertia amplexicaulis*			
94.	5114	*Hibbertia commutata*			
95.	5129	*Hibbertia glomerata*			
96.	5154	*Hibbertia perfoliata*			
97.	5155	*Hibbertia pilosa (Hairy Guinea Flower)*			
98.	5169	*Hibbertia serrata (Serrate Leaved Guinea Flower)*			
99.	5170	*Hibbertia silvestris*			
100.	5816	*Homalospermum firmum*			
101.	3964	*Hovea chorizemifolia (Holly-leaved Hovea)*			
102.	3968	*Hovea trisperma (Common Hovea)*			
103.	5218	*Hybanthus debilissimus*			
104.	6226	*Hydrocotyle callicarpa (Small Pennywort)*			
105.	5818	*Hypocalymma cordifolium*			
106.	8086	*Hypochaeris glabra (Smooth Catsear)*	Y		
107.	1070	*Hypolaena exsulca*			
108.	3997	*Jacksonia alata*			
109.	1297	*Johnsonia lupulina (Hooded Lily)*			
110.		*Kurzia hippurioides*			
111.	18585	*Lagenophora huegelii*			
112.	5033	*Lasiopetalum floribundum (Free Flowering Lasiopetalum)*			
113.	7568	*Lechenaultia biloba (Blue Leschenaultia)*			
114.	936	*Lepidosperma leptostachyum*			
115.	937	*Lepidosperma longitudinale (Pithy Sword-sedge)*			
116.	940	*Lepidosperma pubisquameum*			
117.		*Lepidosperma sp.*			
118.	945	*Lepidosperma squamatum*			
119.	948	*Lepidosperma tetraquetrum*			
120.	1082	*Leptocarpus tenax (Slender Twine Rush)*			
121.	6360	*Leucopogon australis (Spiked Beard-heath)*			
122.	6367	*Leucopogon capitellatus*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
123.	6402	*Leucopogon hirsutus*			
124.	6436	*Leucopogon propinquus*			
125.	6454	*Leucopogon verticillatus (Tassel Flower)*			
126.	44571	*Lilium candidum*	Y		
127.	59	*Lindsaea linearis (Screw Fern)*			
128.	7403	*Lobelia heterophylla (Wing-seeded Lobelia)*			
129.	1223	*Lomandra caespitosa (Tufted Mat Rush)*			
130.	1228	*Lomandra hermaphrodita*			
131.	1229	*Lomandra integra*			
132.	14542	*Lomandra micrantha subsp. micrantha*			
133.	1234	*Lomandra nigricans*			
134.	1238	*Lomandra pauciflora*			
135.	1239	*Lomandra preissii*			
136.	1243	*Lomandra sericea (Silky Mat Rush)*			
137.	7365	*Lonicera japonica (Japanese Honeysuckle)*	Y		
138.	1092	*Loxocarya cinerea*			
139.	85	*Macrozamia riedlei (Zamia, Djiridji)*			
140.	4516	*Melia azedarach (White Cedar)*			
141.	953	*Mesomelaena graciliceps*			
142.	4090	*Mirbelia dilatata (Holly-leaved Mirbelia)*			
143.	8143	*Olearia paucidentata (Autumn Scrub Daisy)*			
144.	7346	*Opercularia echinocephala (Bristly Headed Stink Weed)*			
145.	7348	*Opercularia hispidula (Hispid Stinkweed)*			
146.	17	*Ophioglossum lusitanicum (Adders Tongue)*			
147.	46316	*Orianthera serpyllifolia subsp. angustifolia*			
148.	3618	*Paraserianthes lophantha (Albizia)*			
149.	6246	*Pentapeltis silvatica (Southern Pentapeltis)*			
150.	2262	*Persoonia elliptica (Spreading Snottygobble)*			
151.	2267	*Persoonia longifolia (Snottygobble)*			
152.	18529	*Philotheca spicata (Pepper and Salt)*			
153.	4675	*Phyllanthus calycinus (False Boronia)*			
154.	11928	*Pimelea ciliata subsp. ciliata*			
155.	5269	*Pimelea sylvestris*			
156.	6253	*Platysace filiformis*			
157.	4524	*Platytheca galioides*			
158.	1668	*Prasophyllum brownii*			
159.	41651	*Pteridium esculentum subsp. esculentum*			
160.	13255	*Pterochaeta paniculata*			
161.	1693	*Pterostylis recurva (Jug Orchid)*			
162.	1697	*Pterostylis scabra (Bronze Shell Orchid)*			
163.		*Pterostylis sp.*			
164.	1698	*Pterostylis vittata (Banded Greenhood)*			
165.	48843	*Quercus palustris*	Y		Y
166.	8195	*Quinetia urvillei*			
167.	32480	*Racopilum cuspidigerum var. convolutaceum*			
168.	2932	*Ranunculus colonorum (Common Buttercup)*			
169.	32422	*Rhaphidorrhynchium amoenum*			
170.	32481	*Rhaphidorrhynchium amoenum var. amoenum*			
171.		*Riccardia aequicellularis*			
172.	4695	*Ricinocarpos glaucus*			
173.	32426	*Rosulabryum campylothecium*			
174.	32429	*Rosulabryum torquescens*			
175.	7602	*Scaevola calliptera*			
176.	7635	*Scaevola pilosa (Hairy Fan-flower)*			
177.	16981	*Schizaea rupestris*		P2	
178.	32433	*Sematophyllum homomallum*			
179.	8203	*Senecio diaschides*			
180.	8212	*Senecio leucoglossus*		P4	
181.	20663	*Senecio multicaulis subsp. multicaulis*			
182.	4207	*Sphaerolobium medium*			
183.	4210	*Sphaerolobium scabriusculum*			
184.	14917	*Sporadanthus rivularis*			
185.	9070	*Stackhousia pubescens (Downy Stackhousia)*			
186.	7684	*Stylidium amoenum (Lovely Triggerplant)*			
187.	30278	*Stylidium androsaceum*			
188.	7699	*Stylidium carnosum (Fleshy-leaved Triggerplant)*			
189.	7708	*Stylidium crassifolium (Thick-leaved Triggerplant)*			
190.	11808	*Stylidium diuroides subsp. diuroides*			
191.	7736	*Stylidium hispidum (White Butterfly Triggerplant)*			
192.	7752	*Stylidium lineatum (Sunny Triggerplant)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
193.	7798	*Stylidium schoenoides (Cow Kicks)*			
194.	1260	*Stypandra glauca (Blind Grass)*			
195.	6476	*Styphelia tenuiflora (Common Pinheath)*			
196.	2324	*Synaphea petiolaris (Synaphea)*			
197.	20114	*Taxandria fragrans*			
198.	20135	*Taxandria linearifolia*			
199.		*Telaranea centipes*			
200.	1036	*Tetraria octandra*			
201.	35579	*Tetraria sp. Jarrah Forest (R. Davis 7391)*			
202.	33282	*Tetraria sp. Nannup (P.A. Jurjevich 1133)*		P1	
203.	667	*Tetrarrhena laevis (Forest Ricegrass)*			
204.	48341	*Tetratheca hirsuta subsp. viminea*			
205.	1705	*Thelymitra crinita (Blue Lady Orchid)*			
206.	5091	*Thomasia paniculata*			
207.	5092	*Thomasia pauciflora (Few Flowered Thomasia)*			
208.	17391	*Thomasia sp. Big Brook (M. Koch 2373)*			
209.	32486	*Thuidium sparsum var. hastatum*			
210.	1328	*Thysanotus dichotomus (Branching Fringe Lily)*			
211.	1330	*Thysanotus fastigiatus*			
212.	1339	*Thysanotus multiflorus (Many-flowered Fringe Lily)*			
213.	1485	*Tribonanthes violacea*			
214.	8251	*Trichocline spathulata (Native Gerbera)*			
215.	1361	*Tricoryne elatior (Yellow Autumn Lily)*			
216.	18587	*Triglochin nana*			
217.	13479	*Trymalium ledifolium var. rosmarinifolium*			
218.	33418	*Trymalium odoratissimum subsp. odoratissimum*			
219.	33438	*Trymalium odoratissimum subsp. trifidum*			
220.	15433	*Verticordia huegelii var. huegelii*			
221.	15618	*Verticordia plumosa var. plumosa*			
222.	6575	*Vinca major (Blue Periwinkle)*	Y		
223.	1253	*Xanthorrhoea gracilis (Graceful Grass Tree, Mimidi)*			
224.	1256	*Xanthorrhoea preissii (Grass tree, Palga)*			
225.	6283	*Xanthosia atkinsoniana*			
226.	6284	*Xanthosia candida*			
227.	6289	*Xanthosia huegelii*			
228.	6293	*Xanthosia singuliflora*			
229.	44861	*Xerochrysum macranthum*			
230.	15819	*Xyris atrovirida*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Australian Government
Department of the Environment and Energy

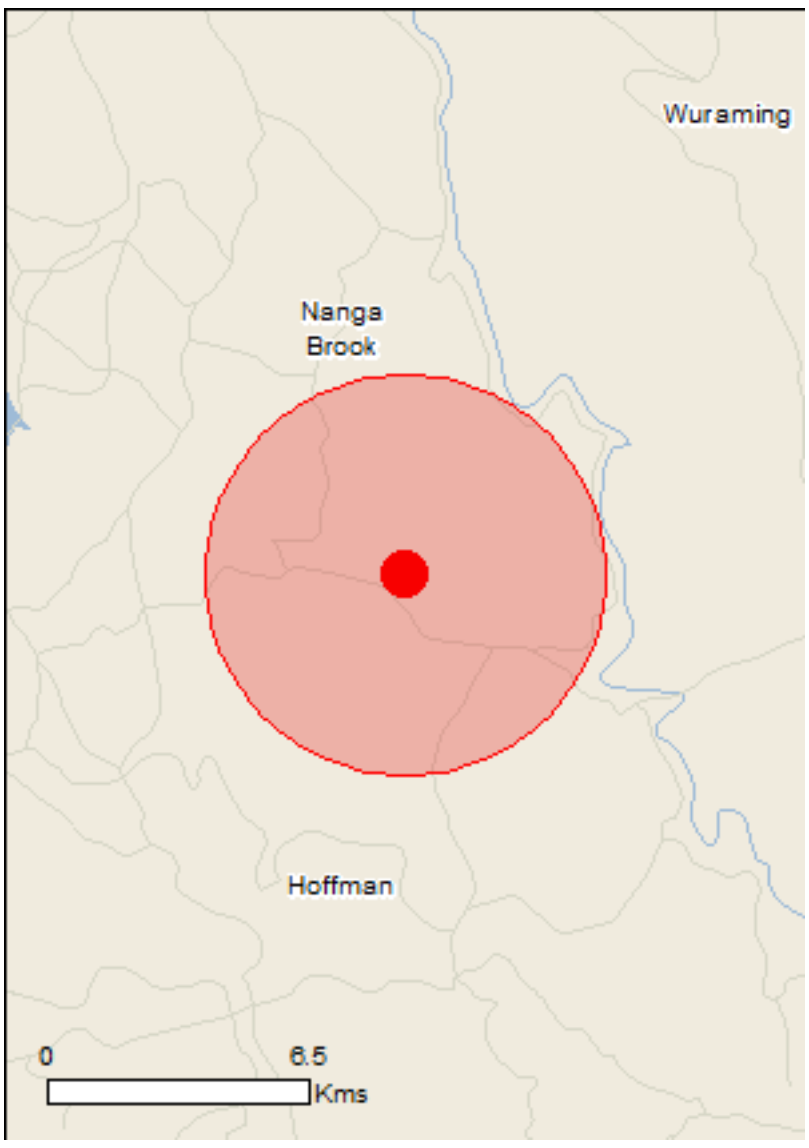
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

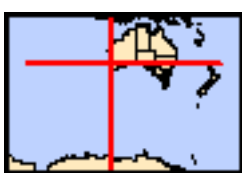
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 06/08/18 12:01:00



Coordinates

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	16
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	13
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	2
Regional Forest Agreements:	1
Invasive Species:	18
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Peel-yalgorup system	30 - 40km upstream

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Atrichornis clamosus		
Noisy Scrub-bird, Tjimiluk [654]	Endangered	Species or species habitat may occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus banksii naso		
Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat likely to occur within area
Calyptorhynchus baudinii		
Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Roosting likely to occur within area
Calyptorhynchus latirostris		
Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Bettongia penicillata ogilbyi		
Woylie [66844]	Endangered	Species or species habitat may occur within area
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Pseudocheirus occidentalis		
Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Other		
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area
Plants		
Anthocercis gracilis Slender Tailflower [11103]	Vulnerable	Species or species habitat may occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat may occur within area
Lasiopetalum pterocarpum Wing-fruited Lasiopetalum [64922]	Endangered	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Lane Poole Reserve	WA
Lane Poole Reserve	WA

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		

Name	Status	Type of Presence
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-32.9214 116.12315

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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FLORA & VEGETATION ASSESSMENT

OF THE HUNTLY EXPANSION AREAS

Prepared By

Mattiske Consulting Pty Ltd

Prepared For

Alcoa of Australia Limited

June 2019




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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
DotEE:	Department of the Environment and Energy
EP Act:	*Environmental Protection Act 1986* (WA)
EPA:	Environmental Protection Authority
EPBC Act:	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
Mattiske:	Mattiske Consulting Pty Ltd
PEC:	Priority ecological community
TEC:	Threatened ecological community
WAH:	Western Australian Herbarium (PERTH)
WAOL:	Western Australian Organism List
WC Act:	*Wildlife Conservation Act 1950* (WA)

EXECUTIVE SUMMARY

Mattiske Consulting Pty Ltd was commissioned in March 2019 by Alcoa of Australia to assess the flora and vegetation within areas east and northeast of the Huntly mining operations area. Two separate areas within the Huntly area were surveyed, covering 606.79 ha in total. A total of 421 sites were assessed during this survey.

A total of 239 vascular plant taxa, representative of 110 genera and 49 families, were recorded within the eastern Huntly expansion survey areas. The majority of taxa recorded were representative of the Fabaceae (38 taxa), Proteaceae (34 taxa), Myrtaceae (24 taxa), Asparagaceae (14 taxa) and Cyperaceae (13 taxa) families. The majority of the taxa recorded were widespread both locally and more broadly within the associated biogeographical subregion; although a range of species were specifically associated with the exposed and shallow granite outcrops.

No threatened flora species pursuant to the *Biodiversity Conservation Act 2016* (WA) (BCA 2016) or the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBCA 1999) were located within the Huntly eastern expansion areas. Three priority 4 flora species (*Grevillea pimeleoides* P4, *Lasiopetalum cardiophyllum* P4 and *Senecio leucoglossus* P4) as listed by the Department of Biodiversity, Conservation and Attractions (DBCA, 2019a) were recorded within the eastern Huntly expansion survey areas. In addition, one *Acacia* species which on current information at the State Herbarium may constitute a new undescribed species was recorded near major granite outcrops within the eastern Huntly expansion survey areas.

A total of four introduced species were recorded within the eastern Huntly expansion survey areas. These species were: **Acacia dealbata* subsp. *dealbata, *Conyza* sp., **Dittrichia graveolens* and **Leptospermum laevigatum.* None of these species are listed as declared pest organisms pursuant to section 22 of the *Biosecurity and Agriculture Management Act 2007*. None are listed as a Weed of National Significance.

No Threatened or Priority Ecological Communities were recorded within the eastern Huntly expansion survey areas.

A total of 16 vegetation types were defined and mapped for the eastern Huntly expansion survey areas. The results reflect several key values, namely:

- the occurrence of the G1, R and DG site-vegetation types in association with granite outcrops.
- the occurrence of the E site-vegetation type that occur on the sandier end of the gravels to sand soil continuum.
- the occurrence of the PW and SW site-vegetation types on the seasonally moister soils on lower and mid slopes. These types reflect site conditions that may influence the need to avoid seasonally moister areas during operational activities due to the potential presence of dieback (*Phytophthora cinnamomi*).
- the dominance of the site-vegetation types – TS, S, P and PS on the sandy-gravel and drier mid and upper slopes.

All of these vegetation types are well represented in the Northern Jarrah Forest, although some occur in localised areas thereby providing a local diversity of inherent flora and vegetation values.

1. INTRODUCTION

Mattiske Consulting Pty Ltd (Mattiske) was commissioned in March 2019 by Alcoa of Australia (Alcoa) to undertake a flora and vegetation assessment of two separate areas within the eastern Huntly area. The purpose of the assessment was to provide information pertaining to mining approvals. The Huntly area is located in State Forest, north of the existing Huntly mine site, and approximately 15 km East of Serpentine (Figure 1). For this assessment, the eastern Huntly expansion survey area consists of two separate areas, each consisting of multiple Alcoa grid blocks (see Methods: Section 4). The survey areas covered 606.79 ha in total, with Area 1 (near the Serpentine Dam) covering 150.96 ha and Area 2 (eastern area) covering 455.83 ha.

1.1. 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 include the:

- *Biodiversity Conservation Act 2016* (BC Act);
- *Biosecurity and Agriculture Management Act 2007* (BAM Act); and
- *Environmental Protection Act 1986* (EP Act).

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

- *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority [EPA] 2016a); and
- *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b).

Definitions of flora and vegetation terminology commonly used throughout this report are provided in Appendix A1-3.

2. BACKGROUND

2.1. Regional Context

According to Beard (1990) the survey areas lie within the Northern Jarrah Forest subregion of the Southwest Forest Region. More recently, the vegetation of Western Australia has been assigned to bioregions and subregions under the Interim Biogeographical Regionalisation for Australia (IBRA; Thackway and Cresswell 1995; Department of the Environment and Energy 2019a). The survey area lies within the Northern Jarrah Forest Subregion (JF1) of the Jarrah Forest (JAF) Region under the IBRA (Version 7).

N

0 2.5 5 km

Scale: 1:350,000
MGA94 (Zone 50)

CAD Ref: a1992_HuntExt_F03_01

Date: June 2019 | Rev: A | A4

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Huntly Project - Huntly Expansion Areas
LOCATION

Figure: **1**

2.2. 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 Alcoa Huntly weather station, approximately 25 km south-west of the survey areas. Annual average rainfall at Huntly is 1220.9 mm (Bureau of Meteorology [BOM] 2019). Rainfall in the month before the survey (February) was minimal compared to the long-term average, furthermore, rainfall at the start of March was also below average (Figure 2).

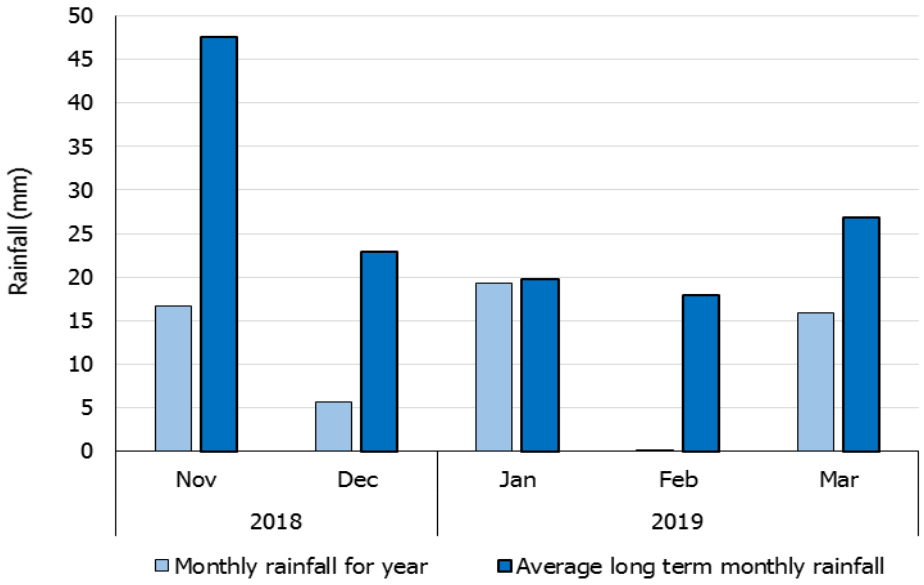


Figure 2: Monthly and long term monthly average rainfall for the Huntly weather station

Note: Long-term average monthly rainfall from 1990 to 2019 (BOM 2019).

2.3. Landforms and Soils

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.

Murray - Deeply incised valleys with red and yellow earths on slopes; narrow alluvial terraces.

Yarragil - Valleys of the western part of the plateau; sandy gravels on the slopes; orange earth in swampy floors.

2.4. Regional Vegetation

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 a 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).

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. Four broad vegetation complexes occur in the general Huntly area (Figure 3), these are:

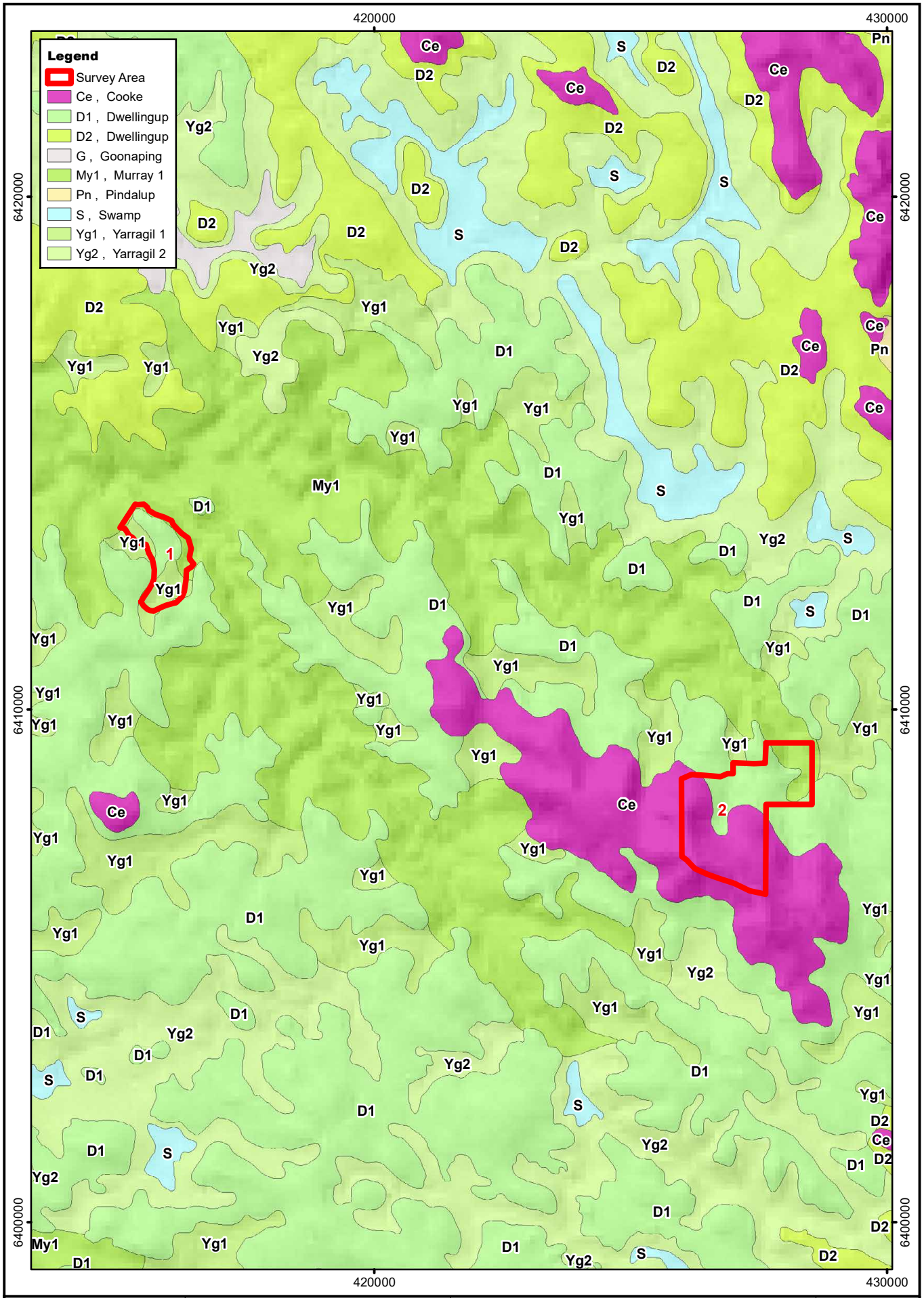
Cooke (Ce)
Mosaic of open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on deeper soils adjacent to outcrops with a closed heath of Myrtaceae - Proteaceae species on lithic complex on granite rocks, with some *Eucalyptus laeliae* and *Allocasuarina huegeliana* in semi-arid areas.

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

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

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

Overall, the Cooke vegetation complex is the dominant complex within the survey area, albeit limited to Area 2 (Table 1). Within Area 1, three vegetation complexes were identified, with the Yarragil 1 being marginally more dominant than the Dwellingup. Within Area 2, four vegetation complexes were identified, with Cooke being dominant, followed by the Dwellingup (Table 1). The Dwellingup 1 vegetation complex in this survey areas occurs at the northern fringes of this complexes extent. The latter reflects the shift to drier slopes on the lateritic hills and slopes to the north of the eastern Huntly expansion survey areas.



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

CAD Ref: a1992_HuntExt_F03_03

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Huntly Project
Huntly Expansion Areas
Regional Forest Agreement Vegetation

Figure: **3**

Table 1: Regional Forest Agreement (RFA) vegetation complexes occurring within the eastern Huntly expansion survey areas, 2019

RFA vegetation complex	Area 1 (ha)	Area 2 (ha)	Combined
Cooke - Ce	-	245.63	**245.63**
Dwellingup 1 – D1	56.50	151.50	**208.0**
Murray 1 – My1	28.08	57.69	**85.77**
Yarragil 1 – Yg1	66.37	1.02	**67.39**

3. OBJECTIVES

The objective of this survey was to undertake a flora and vegetation assessment of the eastern Huntly expansion areas, more specifically:

- Undertake a desktop study of the flora and vegetation of the survey area, with an emphasis on threatened and priority flora, and threatened and priority ecological communities (TEC's and PEC's);
- Undertake a reconnaissance level field assessment of the survey area, and collect and identify the vascular plant species present;
- Review the conservation status of the vascular plant species recorded by reference to current literature and listings by the Department Biodiversity, Conservation and Attractions (DBCA) and plant collections held at the Western Australian State Herbarium (WAH), and listed by the Department of the Environment and Energy (DotEE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- Describe and map the vegetation of the survey area;
- Define and map the location of any Threatened, Priority and Declared pest flora located within the survey area;
- Prepare a report summarising the findings.

4. METHODS

The flora and vegetation of the survey areas was assessed by eight experienced botanists over twenty-eight days in the period from March 2019 to May 2019. Additional field assessments were also undertaken in May to target several species of conservation significance.

4.1. Desktop Assessment

A desktop assessment was conducted using NatureMap (DPaW 2007-) and The EPBC Act Protected Matters Search Tool (DotEE 2019b) databases to identify the possible occurrence of threatened and priority flora and TEC's and PEC's within the survey areas. Database searches were in a 10 km radius based on a point between the two survey areas (coordinates: 32° 26' 51" S and 116° 09' 51" E). Each threatened or priority flora species identified as potentially occurring within the survey areas was ranked as to the likelihood of it occurring. Ranking (Low, Medium and High) was based on the likelihood of suitable habitat within the survey areas, proximity of previous records and distribution of previous records to the survey areas.

4.2. Field Survey

To maintain consistency with previous mapping of the area, enabling spatial and temporal comparisons, flora and vegetation were assessed using the site-vegetation type classification based on Heddle *et al.* (1980). Sites were based on a 120 x 120 m 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. In total, 421 recording sites were assessed on the survey areas.

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) pest species were undertaken whilst walking between survey sites.

The following information was recorded at each recording 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, Banksia littoralis, Banksia seminuda, Corymbia calophylla, Eucalyptus marginata, Eucalyptus megacarpa, Eucalyptus patens, Eucalyptus rudis, Eucalyptus wandoo, Melaleuca preissiana, Melaleuca rhaphiophylla, Nuytsia floribunda, Persoonia elliptica, Persoonia 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-).

Additional targeted searches were undertaken on some of the granite outcrops to expand the knowledge on the species of conservation significance. This latter field work was undertaken in May 2019.

5. DESKTOP ASSESSMENT RESULTS

5.1. Potential Threatened and Priority Flora

One threatened flora species, *Lasiopetalum pterocarpum,* pursuant to section 171 (2) of the *Biodiversity Conservation Regulations 2018* (Table 2; Appendix B) was identified as potentially occurring within the survey area. *Lasiopetalum pterocarpum* is considered Critically Endangered under State legislation and as Endangered pursuant to the EPBC Act (DotEE 2019c). Eight priority flora species as listed by WAH (1998-) were identified as potentially occurring within the survey area (Table 2; Appendix B). A brief description of each follows.

Table 2: Threatened (T) and Priority (P1 to P4) flora potentially occurring within the eastern Huntly expansion survey areas

Note: SCC = State Conservation Code, FCC = Federal Conservation Code

Species	SCC	FCC	Likelihood of
Lasiopetalum pterocarpum	T (CE)	T (E)	Medium
Paracaleana granitica	P1	-	Medium
Banksia recurvistylis	P2	-	Medium-High
Tetratheca phoenix	P2	-	High
Andersonia sp. Audax (F. Hort, B. Hort & J. Hort 3179)	P3	-	Medium
Grevillea pimeleoides	P4	-	High
Hemigenia platyphylla	P4	-	Medium-High
Pimelea rara	P4	-	Medium
Stylidium ireneae	P4	-	Medium-High

Note: CE – delineates Critically Endangered species and E delineates Endangered species

***Lasiopetalum pterocarpum* (T)** – A low open shrub, growing up to 1.5 m high with spreading branches. It produces pale pink to white flowers from August to December (WAH 1998-; Threatened Species Scientific Committee 2017). Considered to be restricted to the Serpentine National Park (Stack and English 2003), it grows in dark red-brown loam or clayey sand over granite on sloping banks of creeklines (WAH 1998-). As this species is associated with granite outcrop areas the potential impacts of any proposed activities remains relatively low.

***Paracaleana granitica* (P1)** – A perennial herb, growing to 0.07 m high on moss mats associated with granite outcrops. It produces green – purple flowers from October to December (WAH 1998-). As this species is associated with granite outcrop areas the potential impacts of any proposed activities remains relatively low.

***Banksia recurvistylis* (P2)** – Erect single stemmed shrub growing up to 2.8 m high. Observed growing in sand, loam and clayey soils associated with laterite and granite (WAH 1998-). Flowering period is unknown; however in view of its foliage and size this species would not be missed in different seasons.

***Tetratheca phoenix* (P2)** – A slender, few branched shrub or subshrub growing up to 0.25 m high. Observed flowering from September to October. Grows in gravelly loam over granite on mid to upper slopes, often near rock outcrops (WAH 1998-). As this species is associated with granite outcrop areas the potential impacts of any proposed activities remains relatively low.

***Andersonia* sp. Audax (F. Hort, B. Hort & J. Hort 3179) (P3)** – Erect single stemmed shrub growing up to 1 m high. Grows in granitic/lateritic soils often associated with granite outcrops. Observed producing

white flowers from October to November (WAH 1998-). As this species is often associated with granite outcrop areas the potential impacts of any proposed activities remains relatively low.

Grevillea pimeleoides **(P4)** – A non-lignotuberous shrub growing up to 2.4 m high in gravelly soils over granite on rocky slopes. It produces yellow-orange flowers from May to November (WAH 1998-). As this species is associated with granite outcrop areas the potential impacts of any proposed activities remains relatively low. In view of its foliage and size this species would not be missed in different seasons.

Hemigenia platyphylla **(P4)** – A spreading shrub growing up to 1.5 m high in sandy, loamy soils associated with granite outcrops on slopes. It produces blue-purple flowers from September to November (WAH 1998-). As this species is associated with granite outcrop areas the potential impacts of any proposed activities remains relatively low. In view of its foliage and size this species would not be missed in different seasons.

Pimelea rara **(P4)** – A low shrub growing up to 0.35 m high in lateritic soils, producing white flowers from December to January (WAH 1998-).

Stylidium ireneae **(P4)** – A delicate perennial herb growing up to 0.3 m high in sandy loam soils near creeklines in valleys. It produces pink flowers from October to December (WAH 1998-). This species was recorded in previous studies on the wider Huntly areas (Mattiske Consulting Pty Ltd 2012).

The EPA (2016a) recommends that flora and vegetation surveys in the South – West Botanical Province be conducted in Spring (September-November). The current survey was conducted in March to May 2019, outside of this period. The summary provided in Table 3 reflects the spread of flowering of most species with some well beyond the spring months. The majority of potential species summarized above can be recorded out of season with the exception of the *Paracaleana granitica, Tetratheca phoenix, Pimelea rara* and *Stylidium ireneae*. However, the *Paracaleana granitica* and *Tetratheca phoenix* are associated with granitic outcrops which are unlikely to be disturbed by proposed activities.

Table 3: Flowering Periods as defined by previous collections in State Herbarium for potential Threatened (T) and Priority (P1 to P4) flora

Species	J	F	M	A	M	J	J	A	S	O	N	D
Lasiopetalum pterocarpum												
Paracaleana granitica												
Banksia recurvistylis	*Unknown but distinctive foliage*											
Tetratheca phoenix												
Andersonia sp. Audax (F. Hort, B. Hort & J. Hort 3179)												
Grevillea pimeleoides												
Hemigenia platyphylla												
Pimelea rara												
Stylidium ireneae												

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

Four introduced species were identified as potentially occurring within the survey area (DPaW 2007-; DotEE 2019b). Of these, none were Declared (plant) pests pursuant to the BAM Act (DPIRD 2019). Furthermore, none of these were Weeds of National Significance (DotEE 2019d).

5.3. Potential Threatened and Priority Ecological Communities

No Federally listed TEC's were identified as potentially occurring within the survey area (DotEE 2019b). No TEC's or PEC's were identified as potentially occurring within the survey area (DBCA 2019c).

5.4. Previous Mattiske Surveys

Over the past forty years, Mattiske (need Heddle) has previously mapped the vegetation associated with the Jarrahdale, Huntly and Myara mines (E.M. Mattiske and Associates 1998, 1992, 1993 and Mattiske Consulting Pty Ltd 2009, 2011, 2012). At a regional scale this work has been undertaken as part of the System 6 studies (Heddle et al. 1980) and then during the Regional Forest Agreement vegetation mapping project (Mattiske and Havel 1998).

The most recent local and specific flora and vegetation study that is relevant to this current survey is the Myara survey area (Mattiske Consulting Pty Ltd 2012) report, which was compiled from field data collected from 2008, 2009, 2010, 2011 and 2012. During the 2012 survey, no threatened flora were recorded, but six priority flora were recorded. These priority species were; *Acacia drummondii* subsp. *affinis* (P3), *Calothamnus rupestris* (P4 in 2012, no longer listed as a priority), *Cyathochaeta teretifolia* (P3), *Senecio leucoglossus* (P4), *Stylidium ireneae* (P4) and *Stylidium longitubum* (P4).

Twenty-three vegetation types were defined and mapped within the Myara survey area. None of these were TEC's or PEC's as defined by the Department of Biodiversity, Conservation and Attractions (2019b and 2019c) or the Department of the Environment and Energy (2019b).

The previous site-vegetation type mapping undertaken in adjacent and nearby areas is summarized on Figure 4 along with the current site-vegetation type mapping (Section 6.6).

6. FIELD SURVEY RESULTS

6.1. Potential Limitations

The potential limitations of the flora and vegetation studies undertaken between March 2019 and May 2019 in the eastern expansion to the Huntly area are summarized in Table 4. In view of the extensive survey work undertaken over 40 years in the northern Jarrah forest and specifically in the local Huntly and Myara areas the survey effort over decades reduces the risk of the survey efforts not meeting current EPA (2016a and 2016b) standards. The only minor constraint was the potential occurrence of several conservation significant flora species that are difficult to identify and record when not in flower. The latter are mainly short-lived perennials or annuals.

Table 4: Potential flora and vegetation survey limitations for the eastern Huntly expansion survey areas

Potential Survey Limitation	Impact on Survey
Sources of information and availability of contextual information (*i.e.* pre-existing background versus new material)	**Not a constraint:** Reference resources such as mapping by Beard 1979, Mattiske and Havel 1998, previous vegetation mapping completed for 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 were thoroughly sampled on a 120 m x 120 m grid pattern within the survey area.
Proportion of flora collected and identified (based on sampling, timing and intensity)	**Not a constraint:** The survey areas were sampled on a 120 m x 120 m grid pattern. The proportion of annual flora collected and identified was low. However, for the purposes of mapping, annual species have little influence on vegetation community definition. The botanists undertaking the field surveys 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.
Completeness and further work which might be needed (was the relevant survey area fully surveyed?)	**Not a constraint:** Vegetation assessment sites were located on a 120 m x 120 m grid pattern within 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 points. There was thorough coverage of the target survey areas.
Mapping reliability	**Not a constraint:** The vegetation was assessed on a 120 m x 120 m grid pattern within the survey area. This together with opportunistic survey sites provided high quality data to enable the survey area to be mapped with a high level of confidence.
Timing, weather, season, cycle	**Minor Constraint:** The EPA (2016a) recommends that flora and vegetation surveys in the South – West Botanical Province be conducted in Spring (September-November). The current survey was conducted in March to May, outside of this period. However, for the purposes of mapping, the site-type vegetation mapping utilised in this report is based on a range of perennial trees, shrubs and herbs. Consequently there is a reduced reliance placed on annual and ephemeral 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 the *Paracaleana granitica, Tetratheca phoenix, Pimelea rara* and *Stylidium ireneae*. However, the *Paracaleana granitica* and *Tetratheca phoenix* are associated with granitic outcrops which are unlikely to be disturbed by proposed activities. Further detailed work has been undertaken in the northern Jarrah forest and near creeklines in the eastern Huntly area in different seasons (including spring months) and therefore the risks remain relatively low for most of the species.

Table 4: Potential flora and vegetation survey limitations for the eastern Huntly expansion survey areas

Potential Survey Limitation	Impact on Survey
Disturbances (fire flood, accidental human intervention, *etc*.)	**Not a constraint:** With the exception of previous logging activities and occasional old forestry tracks, the vegetation of the survey area was largely undisturbed.
Resources (were there adequate resources to complete the survey to the required standard?)	**Not a constraint:** Resources, in terms of equipment, support and personnel were adequate.
Access problems (*i.e.* ability to access survey area)	**Not a constraint:** Vehicle access to the survey area was via roads and tracks which either traversed or passed near to the survey grid blocks. The survey area was relatively small in size and was easily covered by foot traverses from these tracks.
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.

6.2. Flora

A total of 239 vascular plant taxa, representative of 110 genera and 49 families, were recorded within the eastern Huntly expansion survey areas. The majority of taxa recorded were representative of the Fabaceae (38 taxa), Proteaceae (34 taxa), Myrtaceae (24 taxa), Asparagaceae (14 taxa) and Cyperaceae (13 taxa) families (see Appendix C). The majority of the taxa recorded were widespread both locally and more broadly within the associated biogeographical subregion; although a range of species were specifically associated with the exposed and shallow granite outcrops. The representation of the species within the site-vegetation types is summarised in Appendix D.

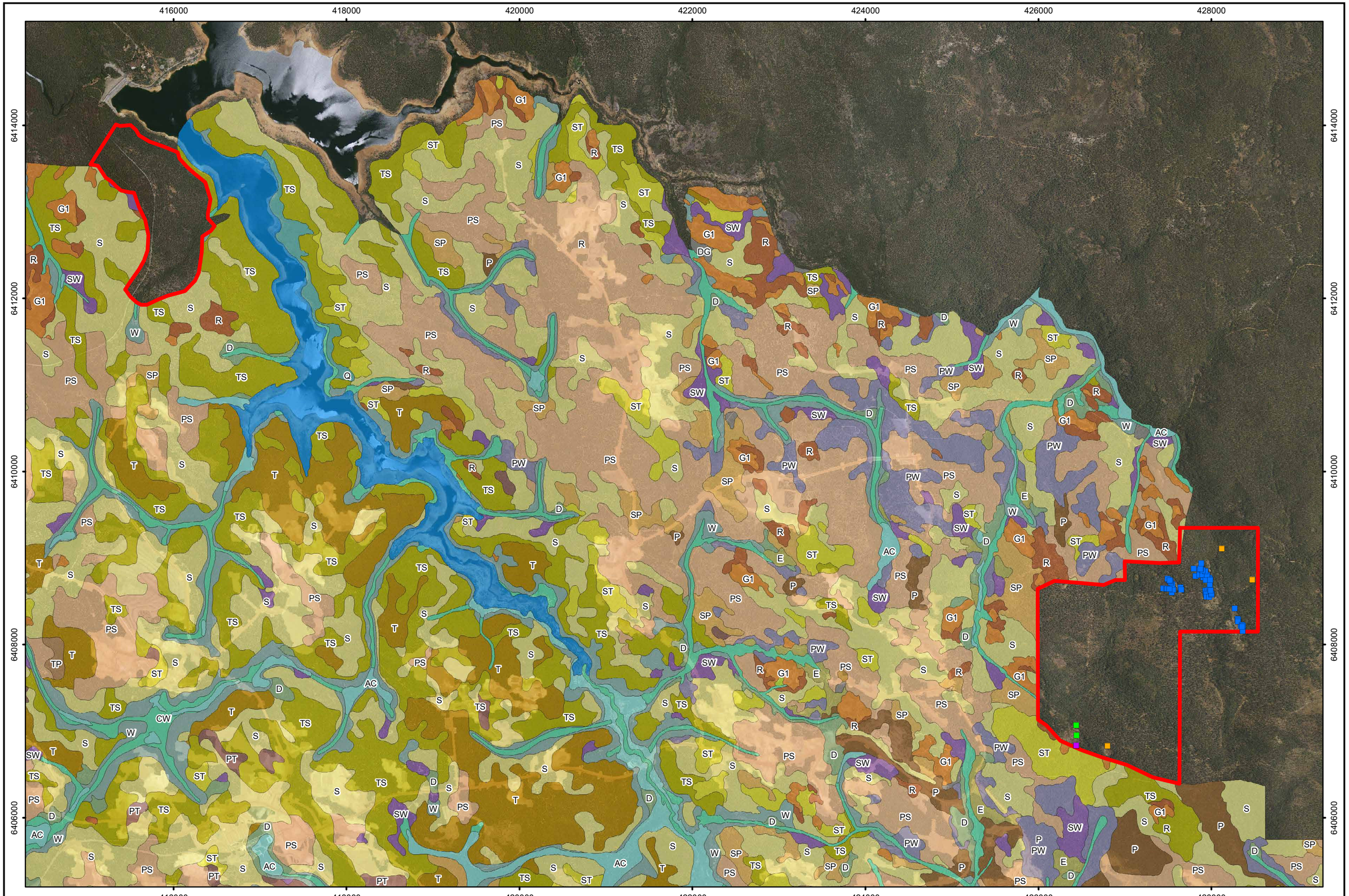
6.3. Threatened and Priority Flora

No threatened flora species pursuant to the *Biodiversity Conservation Act 2016* (WA) (BCA 2016) or the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBCA 1999) were located within the eastern Huntly expansion survey areas. Three priority 4 flora species (*Grevillea pimeleoides* P4, *Lasiopetalum cardiophyllum* P4 and *Senecio leucoglossus* P4) as listed by the Department of Biodiversity, Conservation and Attractions (DBCA, 2019b) were recorded within the eastern Huntly expansion survey areas, Table 5 and Figure 4.

Grevillea pimeleoides (P4) was recorded on large granite outcrops in the southern section of the eastern survey area. This outcrop area is unlikely to be impacted by the proposed activities. Additional numbers were recorded at K4214 3637 in May 2019 during targeted searches on selected granite outcrops for conservation significant species.

Lasiopetalum cardiophyllum (P4) has been recorded extensively by the Mattiske team in the eastern Jarrah forest on sandy-gravel soils in mainly Sheoak-Jarrah-Marri or Jarrah-Marri communities. The three records listed below occurred on sandy-gravel soils on flats and slopes in the eastern survey area.

Senecio leucoglossus (P4) has been recorded extensively by the Mattiske team in the northern Jarrah forest. The record listed below was recorded on a granite outcrop area; although this species is known to extend to sandy-gravel soils.



Legend

- Survey Area

Species

- Acacia sp. (?undescribed species)
- Grevillea pimeleoides (P4)
- Lasiopetalum cardiophyllum (P4)
- Senecio leucoglossus (P4)

Client: ALCOA

N

0 400 800 m

Scale: 1:40,000
MGA94 (Zone 50)

CAD Ref: a1992_HuntExt_F03_05

Date: Jun 2019 | Rev: A | A3

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Huntly Expansion Survey Areas
Threatened and Priority Flora

Figure: **4**

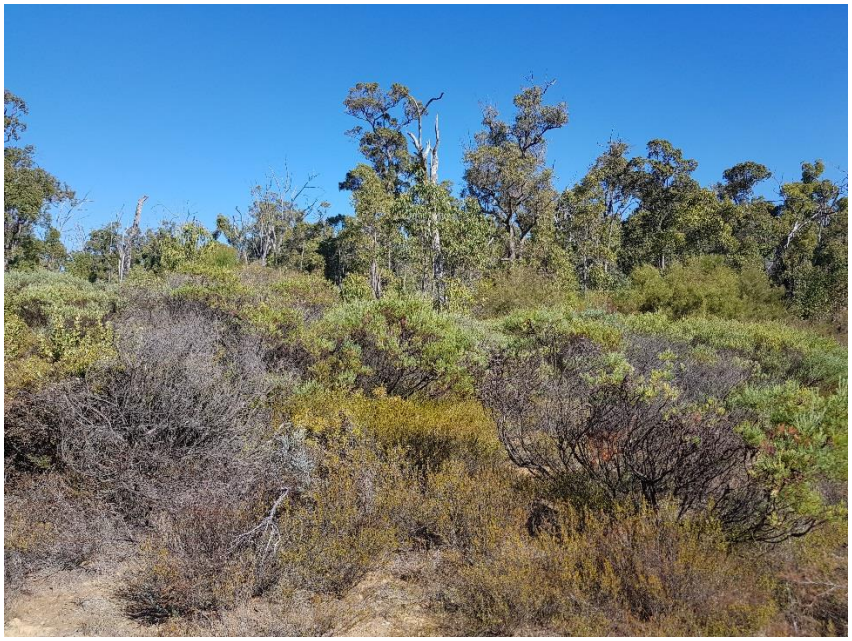
Table 5: Locations of Priority Flora in the eastern Huntly expansion survey areas

Species	Grid Ref	GDA94_Z50H		Population
		Easting (mE)	Northing (mN)	
Grevillea pimeleoides P4	K4214 3240	426439	6407065	5-10 plants
	K4214 4040	426442	6406951	2-5 plants
	K4218 0840	426440	6406835	5-10 plants
	K4214 3637	426359	6407026	>2000 plants
Lasiopetalum cardiophyllum P4	K4204 1632	428121	6409108	2-5 plants
	K4204 4056	428473	6408749	2-5 plants
	K4219 0804	426802	6406829	5-10 plants
Senecio leucoglossus P4	K4218 0840	426440	6406835	2-5 plants

6.4. Potential Undescribed Species

One *Acacia* species which on current information at the State Herbarium may constitute a new undescribed species was recorded at 53 sites within the eastern Huntly expansion survey areas, Appendix E and Figure 4. All of these sites were located near major granite outcrops. The following photographs reflect the distinctive shrubs and also the occurrence in the heath communities associated with the granite outcrops (G1 site-vegetation type).

Photograph 1: *Acacia* sp. (potentially undescribed species)



Photograph 2: Granite Outcrop and Location of *Acacia* species

6.5. Introduced (Weed) Species and Declared Pest (Plant) Organisms

A total of four introduced species were recorded within the eastern Huntly expansion survey areas. These species were: **Acacia dealbata* subsp. *dealbata, *Conyza* sp., **Dittrichia graveolens* and **Leptospermum laevigatum.* None of these species are listed as declared pest organisms pursuant to section 22 of the *Biosecurity and Agriculture Management Act 2007*. None are listed as a Weed of National Significance (DotEE 2019d).

Table 6: Locations of introduced (weed) species in the eastern Huntly expansion survey areas

Species	Grid Ref	GDA94_Z50H	
		Easting (mE)	Northing (mN)
**Acacia dealbata subsp. dealbata*	G4002 3256	415878	6413068
**Conyza* sp.	K4204 3224	427996	6408867
**Dittrichia graveolens*	K4210 2432	426318	6407789
**Leptospermum laevigatum*	G4002 3248	415761	6413059

6.6. Vegetation

A total of 16 site-vegetation types were defined and mapped within the eastern Huntly expansion areas. These mapping units were based on the earlier studies by Havel (1975a and 1975b), and have over several decades been refined by Mattiske. The representation of the site-vegetation types within the eastern Huntly expansion survey areas are summarised in Table 7 and the vegetation map (Figure 5). The dominant species in each site-vegetation type are summarized in Appendix D.

The site-vegetation types TS, S, P and PS are dominant (>10% of survey areas) in the eastern Huntly expansion survey areas on the mid and upper slopes, and are typical of the Dwellingup vegetation complex that dominates the sandy-gravel soils on drier slopes, as defined by Heddle *et al.* (1980) and Mattiske and Havel (1998). The S, ST, T, TS, PS occur on the main lateritic slopes and hills in the northern Darling

Ranges and as such are the key site-vegetation types associated with the bauxite operations in the northern Jarrah forest.

The other codominant communities include those site-vegetation types associated with granite outcrops and shallow granitic soils (G1, R and DG). The latter was particularly evident in the eastern of the two survey areas and as such these results reflect the series of larger granite outcrops associated with the vegetation complexes as defined by Heddle et al. (1980) and Mattiske and Havel (1998) at a regional level. The G1 site-vegetation type is also significant as several of the recorded priority species (Section 6.2) and the potentially new *Acacia* species (Section 6.3) is associated with these major outcrop areas in the eastern Huntly expansion survey areas.

Two site-vegetation types (E and PW) associated with sandier soils were more prevalent in the eastern expansion area. The E site-vegetation type that supports a mixture of Jarrah-Marri (*Eucalyptus marginata – Corymbia calophylla*) over *Kingia australis* is less well represented in the conservation estate as it occurs in localised patches in the northern and central areas of the northern Jarrah forest.

The CW, W and D communities are associated with the lower slopes and creeklines through the Yarragil and Murray valley systems in the survey areas.

The moister soils are associated with the creeklines (CW), the lower slopes (D, DG, W and PW) and the outcrop areas (G1 and R). Consequently these tend to occur around key valley floors or outcrop areas.

Table 7: Representation of Site-Vegetation Types within the eastern Huntly expansion survey areas

Note: G1 is similar to G as defined by Havel (1975a and 1975b). More recent studies on granites in the northern Jarrah forest have defined a series of G subtypes hence G1.

Site-Vegetation Types (based on Havel 1975a	Area (Ha)	% Representation
T	2.64	0.43
TS	65.52	10.80
W	9.17	1.51
CW	14.04	2.31
D	6.80	1.12
DG	1.61	0.27
G1	50.34	8.30
R	52.03	8.58
E	39.01	6.43
PW	39.27	6.47
P	71.11	11.72
PS	67.34	11.10
SP	30.32	5.00
SW	7.08	1.17
S	145.13	23.92
ST	5.38	0.89
Total	**606.79**	**100.00**

6.7 Threatened and Priority Ecological Communities

No TECs, pursuant to Schedule 1 of the WC Act and as listed by the DBCA (2019c) were recorded within the eastern Huntly expansion survey areas. No TEC's or PECs as listed by the DBCA (2019b and 2019c) were recorded within the eastern Huntly expansion survey areas.

6.8 Significance of Vegetation Complexes and Site-Vegetation Types

Four vegetation complexes have been defined and mapped in the eastern Huntly expansion survey areas, namely:

Cooke (Ce) Mosaic of open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on deeper soils adjacent to outcrops with a closed heath of Myrtaceae-Proteaceae species on lithic complex on granite rocks, with some *Eucalyptus laeliae* and *Allocasuarina huegeliana* in semi-arid areas. This complex is well represented in the conservation estate with some 34.85% of its extent included in Informal and Formal reserves (Conservation Commission 2103).

Dwellingup 1 (D1)
Open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on lateritic uplands in mainly humid and subhumid zones. This complex is slightly lower in representation within the conservation estate with some 14.68% of its extent included in Informal and Formal reserves (Conservation Commission 2103).

Murray 1 (My1)
Open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* - *Eucalyptus patens* on valley slopes to woodland of *Eucalyptus rudis – Melaleuca rhaphiophylla* on the valley floors in humid and subhumid zones. This complex is well represented in the conservation estate with some 36.02% of its extent included in Informal and Formal reserves (Conservation Commission 2103).

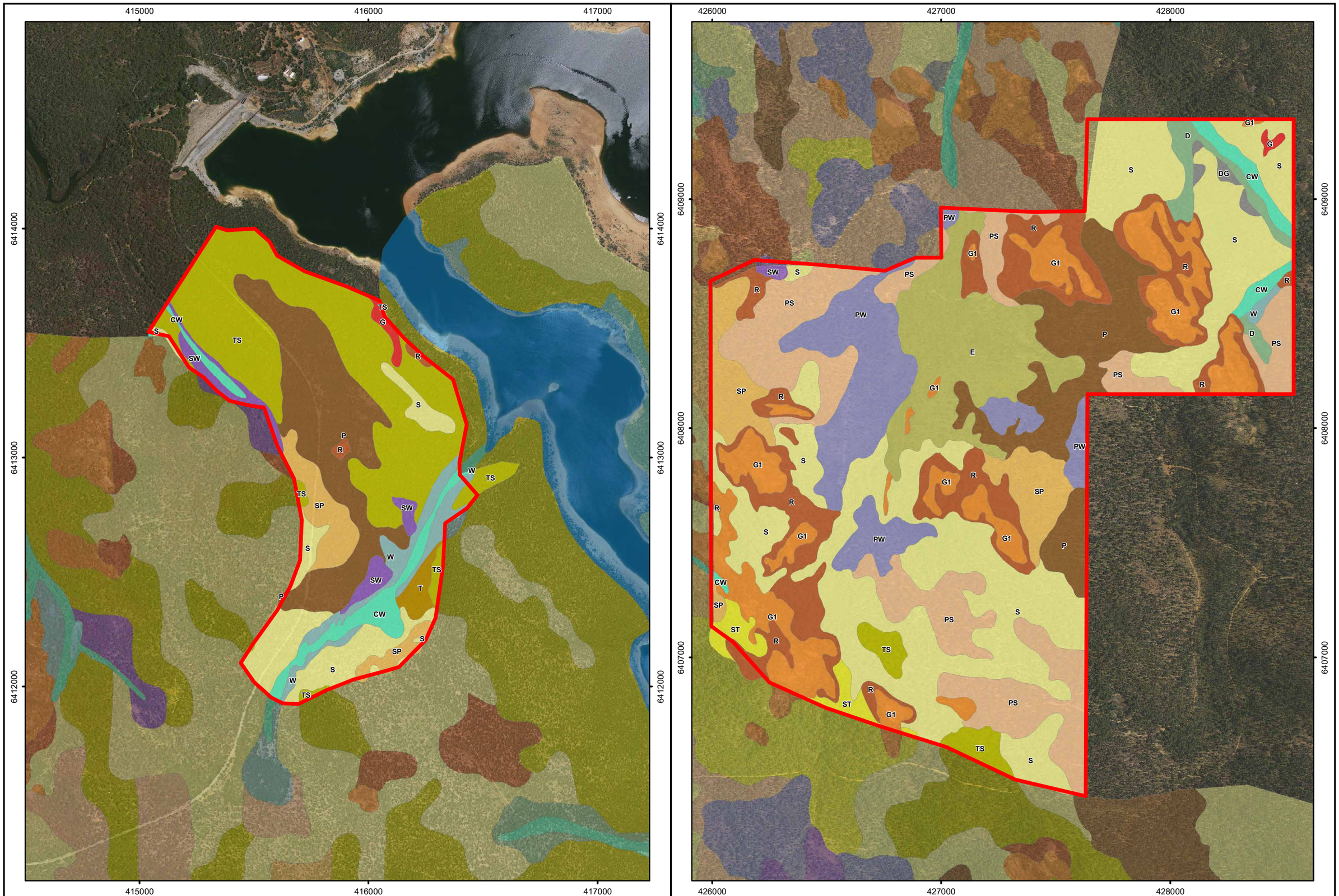
Yarragil 1 (Yg1)
Open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on slopes with mixtures of *Eucalyptus patens* and *Eucalyptus megacarpa* on the valley floors in humid to subhumid zones. This complex is well represented in the conservation estate with some 29.86% of its extent included in Informal and Formal reserves (Conservation Commission 2103).

The main areas of significance from a botanical perspective are the series of granite outcrops associated with the Cooke (Ce) vegetation complex and the G1, R and DG site-vegetation types particularly in the eastern survey area which support a range of structural formations locally from lithic complexes to shrublands and heaths to open woodlands. These areas particularly with the G1 and R site-vegetation types support a range of Priority species and a potential new *Acacia* species (Sections 6.2 and 6.3). These areas are unlikely to be impacted by the proposed activities.

The other main significant site-vegetation type is the E site-vegetation type which is patchy and localised in the northern Jarrah forest and as such therefore less well represented in the conservation estate. This site-vegetation type occurs in the eastern survey area and occurs on sandier soils and therefore is likely to be impacted by the proposed activities.

6.9 Condition of the Vegetation

Several areas were reflecting some degree of degradation from drought and dieback (*Phytophthora cinnamomi*). The latter was particular evident in lower slopes supporting the PW and SW site-vegetation types. Both of these latter site-vegetation types tend to reflect the presence of key understorey species that prefer mister soils such as *Hypocalymma angustifolium* and *Babingtonia camphorosmae.* Otherwise the vegetation in less disturbed, although there are a series of forest access tracks through the respective areas. The latter assessment is supported by the low numbers of introduced species within the survey areas.



Legend

Survey Area, CW, D, DG, E, G1, P, PS, PW, R, S, SP, ST, SW, TS, W

Client: ALCOA

N

0 150 300 m

Scale: 1:15,000
MGA94 (Zone 50)

CAD Ref: a1992_HuntExt_F03_06

Date: Jun 2019 | Rev: A | A3

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Huntly Expansion Areas Vegetation

Figure: 5

7. DISCUSSION

The objective of the botanical studies was to assess the flora and vegetation values on two expansion areas to the east of the Huntly mining operations.

In view of the extensive survey work undertaken over 40 years in the northern Jarrah forest and specifically in the local Huntly and Myara areas the survey effort over decades reduces the risk of the survey efforts not meeting current EPA (2016a and 2016b) standards. The only minor constraint was the potential occurrence of several conservation significant flora species that are difficult to identify and record when not in flower. The latter are mainly short-lived perennials or annuals.

A total of 239 vascular plant taxa, representative of 110 genera and 49 families, were recorded within the eastern Huntly expansion survey areas. The majority of taxa recorded were representative of the Fabaceae (38 taxa), Proteaceae (34 taxa), Myrtaceae (24 taxa), Asparagaceae (14 taxa) and Cyperaceae (13 taxa) families. The majority of the taxa recorded were widespread both locally and more broadly within the associated biogeographical subregion; although a range of species were specifically associated with the exposed and shallow granite outcrops. The majority of the taxa recorded were widespread both locally and more broadly within the associated biogeographical subregion.

No threatened flora species pursuant to the *Biodiversity Conservation Act 2016* (WA) (BCA 2016) or the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBCA 1999) were located within the eastern Huntly expansion survey areas. Three priority 4 flora species (*Grevillea pimeleoides* P4, *Lasiopetalum cardiophyllum* P4 and *Senecio leucoglossus* P4) as listed by the Department of Biodiversity, Conservation and Attractions (DBCA, 2019a) were recorded within the eastern Huntly expansion survey areas. In addition, a potential new *Acacia s*pecies was recorded near large granite outcrops on the eastern survey area. To address the minor constraint related to some of the potential conservation flora species and the need to collect more flowering and fruiting material of the potentially new Acacia species it is recommended that additional targeted searches near the granite outcrop areas in the eastern survey area are undertaken in the spring months of 2019. As the proposed activities are unlikely to directly impact the granite outcrops the proposed additional spring work should not delay current expansion in the areas away from these large granite outcrop areas.

A total of four introduced species were recorded within the eastern Huntly expansion survey areas. These species were: **Acacia dealbata* subsp. *dealbata, *Conyza* sp., **Dittrichia graveolens* and **Leptospermum laevigatum.* None of these species are listed as declared pest organisms pursuant to section 22 of the *Biosecurity and Agriculture Management Act 2007* (DPIRD 2019). None are listed as a Weed of National Significance (DotEE 2019d).

The vegetation complexes are generally well represented in the conservation estate, although the Dwellingup 1 (D1) complex is less than the other three complexes in coverage.

A total of 16 vegetation types were defined and mapped for the eastern Huntly expansion survey areas. The results reflect several key values, namely:

- the occurrence of the G1, R and DG site-vegetation types in association with granite outcrops.
- the occurrence of the E site-vegetation type that occur on the sandier end of the gravels to sand soil continuum.
- the occurrence of the PW and SW site-vegetation types on the seasonally moister soils on lower and mid slopes. These types reflect site conditions that may influence the need to avoid seasonally moister areas during operational activities due to the potential presence of dieback (*Phytophthora cinnamomi*).
- the dominance of the site-vegetation types – TS, S, P and PS on the sandy-gravel and drier mid and upper slopes.

All of these vegetation types are well represented in the Northern Jarrah Forest, although some occur in localised areas thereby providing a local diversity of inherent flora and vegetation values.

No TECs as listed by the DBCA (2019b), or PECs as listed by the DBCA (2019c), were recorded within the eastern Huntly expansion survey areas.

The main areas of significance from a botanical perspective are the series of granite outcrops particularly in the eastern survey area which support a range of structural formations locally from lithic complexes to shrublands and heaths to open woodlands. These areas also support a range of Priority species and a potential new *Acacia* species. These areas are unlikely to be impacted by the proposed activities.

The other main significant site-vegetation type is the E site-vegetation type which is patchy and localised in the northern Jarrah forest and as such therefore less well represented in the conservation estate. This site-vegetation type occurs in the eastern survey area and occurs on sandier soils and therefore is likely to be impacted by the proposed activities.

Overall, the main botanical values that require additional attention in the eastern Huntly expansion survey areas are the range of conservation flora species that are short-lived perennials and annuals and the potentially new Acacia species which is associated with the major granite outcrops.

8. ACKNOWLEDGEMENTS

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9. PERSONNEL

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

NAME	POSITION	PROJECT INVOLVEMENT	FLORA COLLECTION PERMITS
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Dr S Ruoss	Experienced Ecologist	Planning, Fieldwork	FB62000031/TFL 17-1819
Mr A Barrett	Experienced Botanist	Planning, Fieldwork	FB62000030
Mr R Dharmarajan	Experienced Botanist	Fieldwork	FB62000028
Mr L Rowles	Biologist	Fieldwork	FB62000020
Ms K Lambert	Botanist	Fieldwork	FB62000023
Ms E Chetwin	Biologist/Geologist	Fieldwork	FB62000026
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Ms L Taaffe	Botanist	Fieldwork	FB62000021
Mr B Ellery	Senior Botanist	Plant identification	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 likely to become extinct or are otherwise in need of special protection in Western Australia under Part 10 (Division 2).

Threatened flora are listed in the *Wildlife Conservation (Rare Flora) Notice 2018* (under Part 2 of the BC Act; Department of Biodiversity, Conservation and Attractions (DBCA 2019a) 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 2016. 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 Department of Biodiversity, Conservation and Attractions (2019a).

CODE	CATEGORY	DEFINITION
CR	**Critically endangered**	Species considered to be facing an extremely high risk of becoming extinct in the wild in the immediate future (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 in the near future (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 in the medium-term future (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" (Priorities 1, 2 or 3); or are "adequately known, are rare but not threatened, or meet criteria for near threatened or have recently been removed from the threatened species list for other than taxonomic reasons" (Priority 4) (Department of Biodiversity, Conservation and Attractions 2019a). **Priority species are not afforded any protection under state or federal legislation**, 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 Department of Biodiversity, Conservation and Attractions (2019a).

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.

The *Biodiversity Conservation Act 2016* (BC Act) provides for (amongst other things) some protection of ecological communities at risk of collapse in Western Australia under Part 3 (Division 2).

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 of the BC Act 2016) Department of Biodiversity, Conservation and Attractions 2019b). 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). 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 Department of Environment and Conservation (2013).

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 Department of Biodiversity, Conservation and Attractions (2019c) 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 Department of Environment and Conservation (2013).

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 2019).

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 B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT WITHIN THE HUNTLY EXTENSION SURVEY AREA

Refer to Appendix A for State (SCC) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; JAF – Jarrah Forest; SWA – Swan Coastal Plain; WAR – Warren.

Taxon / Common Name	Family	SCC	FCC	Description and Habitat	Potential to Occur in Survey Area
Lasiopetalum pterocarpum	MALVACEAE	T	E	Habit: Open, multi-stemmed shrub (with distinctly winged fruit), to 1.2 m high. Flowers: pink Flowering period: Aug to Dec Soils: Dark red-brown loam or clayey sand over granite. On sloping banks near creeklines. IBRA Distribution: JAF Florabase records: 11	Medium Preferred soils potentially present in survey area. Restricted to small area north of the survey area.
Paracaleana granitica	ORCHIDACEAE	P1	-	Habit: Perennial herb, to 0.07 m high. Flowers: green-purple Flowering period: Oct to Dec Soils: Growing on moss mats. Granite outcrops. IBRA Distribution: JAF Florabase records: 6	Medium Preferred soils likely to be present in survey area.
Banksia recurvistylis	PROTEACEAE	P2	-	Habit: Erect, single stemmed shrub, to 2.8 m high. Flowers: - Flowering period: - Soils: sand, loam and clayey soils associated with laterite and granite. IBRA Distribution: JAF Florabase records: 7	Medium-High Preferred soils potentially present in survey area. Recorded near the survey area.
Tetratheca phoenix	ELAEOCARPACEAE	P2	-	Habit: Few branched subshrub, to 0.25 m high. Flowers: - Flowering period: - Soils: Brown gravelly loam over granite on slopes, often associated with rock outcrops. IBRA Distribution: JAF Florabase records: 9	High Previously recorded adjacent to the survey area.

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT WITHIN THE HUNTLY EXTENSION SURVEY AREA

Refer to Appendix A for State (SCC) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; JAF – Jarrah Forest; SWA – Swan Coastal Plain; WAR – Warren.

Taxon / Common Name	Family	SCC	FCC	Description and Habitat	Potential to Occur in Survey Area
Andersonia sp. Audax (F. Hort, B. Hort & J. Hort 3179)	ERICACEAE	P3	-	Habit: Erect single stemmed shrub, to 1 m high. Flowers: white Flowering period: Oct to Nov Soils: granitic/lateritic soils associated with granite outcrops. IBRA Distribution: JAF Florabase records: 22	Medium Preferred soils likely to be present in survey area.
Grevillea pimeleoides	APIACEAE	P4	-	Habit: Non-lignotuberous shrub, to 2.4 m high. Flowers: yellow-orange Flowering period: May to Nov Soils: gravelly soils over granite on rocky slopes. IBRA Distribution: JAF Florabase records: 36	High Preferred soils potentially present in survey area.
Hemigenia platyphylla	LAMIACEAE	P4	-	Habit: Semi-prostrate to erect spreading shrub, 0.2 up to 1.5 m high. Flowers: pink-purple Flowering period: Sep to Nov Soils: sand and loam soils, associated with granite rocks on slopes. IBRA Distribution: AVW, ESP, JAF Florabase records: 19	Medium-High Preferred soils potentially present in survey area.
Pimelea rara	THYMELAEACEAE	P4	-	Habit: Small shrub, to 0.35 m high. Flowers: white Flowering period: Dec to Jan Soils: lateritic soils. IBRA Distribution: JAF Florabase records: 52	Medium Preferred soils likely to be present in survey area.

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT WITHIN THE HUNTLY EXTENSION SURVEY AREA

Refer to Appendix A for State (SCC) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; JAF – Jarrah Forest; SWA – Swan Coastal Plain; WAR – Warren.

Taxon / Common Name	Family	SCC	FCC	Description and Habitat		Potential to Occur in Survey Area
Stylidium ireneae	STYLIDIACEAE	P4	-	Habit: Flowers: Flowering period: Soils: IBRA Distribution: Florabase records:	Lax perennial, herb, (0.06-)0.1-0.28 m high, leaves oblanceolate, 0.4-2 cm long, 1-3(-5) mm wide, apex subacute to acuminate, margin entire, glandular. pink Oct to Dec Sandy loam. Valleys near creek lines. JAF, SWA, WAR 21	Medium-High Preferred soils potentially present in survey area.

APPENDIX C: VASCULAR PLANT SPECIES RECORDED WITHIN THE EASTERN HUNTLY EXPANSION SURVEY AREAS, 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)
SCC - State Conservation Code (DBCA 2019b) and Federal Conservation Code (DotEE 2019a)

FAMILY	SPECIES	SCC	FCC
DENNSTAEDTIACEAE	*Pteridium esculentum*		
LINDSAEACEAE	*Lindsaea linearis*		
ZAMIACEAE	*Macrozamia riedlei*		
POACEAE	*Amphipogon amphipogonoides*		
	Austrostipa sp.		
	Neurachne alopecuroidea		
	Rytidosperma caespitosum		
	Tetrarrhena laevis		
CYPERACEAE	*Cyathochaeta avenacea*		
	Gahnia aristata		
	Gahnia decomposita		
	Lepidosperma pubisquameum sen. lat.		
	Lepidosperma sp.		
	Lepidosperma squamatum		
	Lepidosperma tenue		
	Lepidosperma tetraquetrum		
	Lepidosperma tuberculatum		
	Mesomelaena tetragona		
	Tetraria capillaris		
	Tetraria octandra		
	Tetraria sp. Jarrah Forest (R. Davis 7391)		
RESTIONACEAE	*Desmocladus fasciculatus*		
	Desmocladus flexuosus		
	Desmocladus sp.		
	Loxocarya cinerea		
	Loxocarya striata		
CENTROLEPIDACEAE	*Centrolepis* sp.		
ASPARAGACEAE	*Dichopogon preissii*		
	Laxmannia grandiflora		
	Lomandra drummondii		
	Lomandra hermaphrodita		
	Lomandra micrantha		
	Lomandra preissii		
	Lomandra purpurea		
	Lomandra sericea		
	Lomandra sonderi		
	Lomandra sp.		
	Lomandra spartea		
	Thysanotus dichotomus		
	Thysanotus fastigiatus		
	Thysanotus multiflorus		
DASYPOGONACEAE	*Kingia australis*		
XANTHORRHOEACEAE	*Xanthorrhoea gracilis*		
	Xanthorrhoea preissii		

APPENDIX C: VASCULAR PLANT SPECIES RECORDED WITHIN THE EASTERN HUNTLY EXPANSION SURVEY AREAS, 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)
SCC - State Conservation Code (DBCA 2019b) and Federal Conservation Code (DotEE 2019a)

FAMILY	SPECIES	SCC	FCC
COLCHICACEAE	*Burchardia congesta*		
BORYACEAE	*Borya sphaerocephala*		
HEMEROCALLIDACEAE	*Agrostocrinum hirsutum*		
	Dianella revoluta		
	Tricoryne sp.		
HAEMODORACEAE	*Conostylis pusilla*		
	Conostylis serrulata		
	Conostylis setigera		
	Conostylis setosa		
	Conostylis sp.		
IRIDACEAE	*Patersonia occidentalis*		
	Patersonia pygmaea		
	Patersonia rudis		
CASUARINACEAE	*Allocasuarina fraseriana*		
	Allocasuarina humilis		
	Allocasuarina sp.		
PROTEACEAE	*Adenanthos barbiger*		
	Adenanthos obovatus		
	Banksia armata		
	Banksia dallanneyi subsp. *dallanneyi*		
	Banksia grandis		
	Banksia littoralis		
	Banksia sessilis		
	Banksia sphaerocarpa		
	Banksia undata		
	Banksia sp.		
	Grevillea bipinnatifida		
	Grevillea manglesii subsp. *manglesii*		
	Grevillea pimeleoides	P4	
	Grevillea pulchella		
	Grevillea wilsonii		
	Hakea amplexicaulis		
	Hakea cyclocarpa		
	Hakea incrassata		
	Hakea lissocarpha		
	Hakea petiolaris		
	Hakea ruscifolia		
	Hakea undulata		
	Hakea varia		
	Isopogon dubius		
	Isopogon sphaerocephalus		
	Isopogon sp. Darling Range (F. Hort 1662)		
	Persoonia angustiflora		
	Persoonia elliptica		
	Persoonia longifolia		
	Petrophile serruriae		
	Petrophile striata		

APPENDIX C: VASCULAR PLANT SPECIES RECORDED WITHIN THE EASTERN HUNTLY EXPANSION SURVEY AREAS, 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)
SCC - State Conservation Code (DBCA 2019b) and Federal Conservation Code (DotEE 2019a)

FAMILY	SPECIES	SCC	FCC
PROTEACEAE (continued)	*Petrophile* sp.		
	Stirlingia simplex		
	Synaphea sp.		
SANTALACEAE	*Leptomeria cunninghamii*		
RANUNCULACEAE	*Clematis pubescens*		
	Ranunculus colonorum		
LAURACEAE	*Cassytha* sp.		
DROSERACEAE	*Drosera* sp.		
PITTOSPORACEAE	*Billardiera fusiformis*		
	Billardiera variifolia		
	Billardiera sp.		
	Marianthus drummondianus		
	Marianthus tenuis		
FABACEAE	* *Acacia dealbata* subsp. *dealbata*		
	Acacia alata		
	Acacia barbinervis		
	Acacia divergens		
	Acacia drummondii subsp. c*andolleana*		
	Acacia ephedroides		
	Acacia extensa		
	Acacia lateriticola		
	Acacia nervosa		
	Acacia obovata		
	Acacia pulchella		
	Acacia saligna		
	Acacia urophylla		
	Acacia willdenowiana		
	Acacia sp. (potential new species)		
	Bossiaea aquifolium subsp. *aquifolium*		
	Bossiaea ornata		
	Chorizema cordatum		
	Daviesia cordata		
	Daviesia decurrens		
	Daviesia horrida		
	Daviesia preissii		
	Daviesia sp.		
	Gastrolobium villosum		
	Gompholobium knightianum		
	Gompholobium marginatum		
	Gompholobium polymorphum		
	Gompholobium preissii		
	Gompholobium tomentosum		
	Hovea chorizemifolia		
	Hovea trisperma		
	Isotropis cuneifolia subsp. *cuneifolia*		
	Kennedia coccinea		
	Kennedia prostrata		

APPENDIX C: VASCULAR PLANT SPECIES RECORDED WITHIN THE EASTERN HUNTLY EXPANSION SURVEY AREAS, 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)
SCC - State Conservation Code (DBCA 2019b) and Federal Conservation Code (DotEE 2019a)

FAMILY	SPECIES	SCC	FCC
FABACEAE (continued)	*Labichea punctata*		
	Mirbelia dilatata		
	Paraserianthes lophantha		
	Sphaerolobium medium		
GERANIACEAE	*Erodium* sp.		
RUTACEAE	*Asterolasia pallida*		
	Boronia crenulata		
	Boronia fastigiata		
	Boronia molloyae		
	Philotheca spicata		
	Rutaceae sp.		
POLYGALACEAE	*Comesperma calymega*		
	Comesperma virgatum		
EUPHORBIACEAE	*Monotaxis occidentalis*		
PHYLLANTHACEAE	*Phyllanthus calycinus*		
SAPINDACEAE	*Dodonaea ceratocarpa*		
RHAMNACEAE	*Trymalium ledifolium*		
	Trymalium odoratissimum subsp. *odoratissimum*		
RUTACEAE	*Tetratheca hirsuta*		
MALVACEAE	*?Thomasia sp.*		
	Lasiopetalum cardiophyllum	P4	
	Lasiopetalum floribundum		
	Lasiopetalum glabratum		
	Thomasia ?macrocalyx		
	Malvaceae sp.		
DILLENIACEAE	*Hibbertia acerosa*		
	Hibbertia amplexicaulis		
	Hibbertia commutata		
	Hibbertia ovata		
	Hibbertia perfoliata		
	Hibbertia silvestris		
	Hibbertia sp.		
THYMELAEACEAE	*Pimelea ciliata*		
	Pimelea sp.		
MYRTACEAE	*Astartea scoparia*		
	Babingtonia camphorosmae		
	Calothamnus quadrifidus		
	Calothamnus sanguineus		
	Calytrix ?depressa		
	Calytrix sp.		
	Corymbia calophylla		

APPENDIX C: VASCULAR PLANT SPECIES RECORDED WITHIN THE EASTERN HUNTLY EXPANSION SURVEY AREAS, 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)
SCC - State Conservation Code (DBCA 2019b) and Federal Conservation Code (DotEE 2019a)

FAMILY	SPECIES	SCC	FCC
MYRTACEAE (continued)	*Darwinia citriodora*		
	Eucalyptus marginata		
	Eucalyptus megacarpa		
	Eucalyptus patens		
	Eucalyptus rudis		
	Hypocalymma angustifolium		
	Hypocalymma cordifolium		
	Hypocalymma robustum		
	Kunzea glabrescens		
	Leptospermum erubescens		
	* *Leptospermum laevigatum*		
	Melaleuca ?parviceps		
	Melaleuca ?trichophylla		
	Melaleuca viminea		
	Pericalymma ellipticum		
	Taxandria linearifolia		
	Verticordia plumosa var. *plumosa*		
HALORAGACEAE	*Glischrocaryon aureum*		
	Gonocarpus benthamii subsp. *benthamii* ms		
APIACEAE	*Pentapeltis peltigera*		
	Platysace compressa		
	Platysace filiformis		
	Platysace tenuissima		
	Xanthosia atkinsoniana		
	Xanthosia candida		
	Xanthosia huegelii		
ERICACEAE	*Andersonia* sp.		
	Astroloma ciliatum		
	Astroloma pallidum		
	Astroloma sp.		
	Leucopogon capitellatus		
	Leucopogon nutans		
	Leucopogon propinquus		
	Leucopogon sp.		
	Leucopogon verticillatus		
	Styphelia tenuiflora		
LAMIACEAE	*Hemigenia ?incana*		
	Hemigenia pritzelii		
	Hemiphora bartlingii		
RUBIACEAE	*Opercularia echinocephala*		
CAMPANULACEAE	*Lobelia* sp.		
GOODENIACEAE	*Dampiera hederacea*		
	Dampiera linearis		
	Lechenaultia biloba		
	Scaevola calliptera		

APPENDIX C: VASCULAR PLANT SPECIES RECORDED WITHIN THE EASTERN HUNTLY EXPANSION SURVEY AREAS, 2019

Note : * denotes intrdouced species, T, P1 to P4 reflect Threatened and Prioirty species (DBCA 2019a)
SCC - State Conservation Code (DBCA 2019b) and Federal Conservation Code (DotEE 2019a)

FAMILY	SPECIES	SCC	FCC
STYLIDIACEAE	*Stylidium amoenum*		
	Stylidium ciliatum		
	Stylidium dichotomum		
	Stylidium piliferum		
	Stylidium repens		
	Stylidium sp.		
ASTERACEAE	Asteraceae sp.		
	* *Conyza sp.*		
	* *Dittrichia graveolens*		
	Pterochaeta paniculata		
	Senecio diaschides		
	Senecio leucoglossus	P4	
	Senecio quadridentatus		
	Senecio sp.		
	Trichocline spathulata		

APPENDIX D: VASCULAR PLANT SPECIES RECORDED BY SITE-VEGETATION TYPE WITHIN THE EASTERN HUNTLY EXPANSION SURVEY AREAS

Note: * denotes introduced species, P1 to P4 denotes Priority Flora species (DBCA 2019a)

		Site-Vegetation Type														
	Species	**T**	**TS**	**W**	**CW**	**D**	**DG**	**R**	**G**	**E**	**PW**	**P**	**PS**	**SP**	**S**	**SW**	**ST**
	Acacia alata	x	x		x	x		x	x	x		x	x		x		
	Acacia barbinervis									x		x					
*	*Acacia dealbata* subsp. *dealbata*							x									
	Acacia divergens				x					x							
	Acacia drummondii subsp. *candolleana*		x														
	Acacia ephedroides								x								
	Acacia extensa				x	x											
	Acacia lateriticola							x	x	x	x	x	x		x		
	Acacia nervosa														x		
	Acacia obovata							x	x		x			x			
	Acacia pulchella	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Acacia saligna							x		x	x		x		x		
	Acacia sp. potential new species								x								
	Acacia urophylla	x	x	x		x		x	x		x		x	x	x		x
	Acacia willdenowiana			x	x									x			
	Adenanthos barbiger	x	x	x				x		x	x	x	x	x	x	x	x
	Adenanthos obovatus	x						x									
	Agrostocrinum hirsutum					x		x	x		x						
	Allocasuarina fraseriana		x					x		x	x	x	x	x	x		
	Allocasuarina humilis							x	x		x	x					
	Allocasuarina sp.										x						
	Amphipogon amphipogonoides	x	x			x		x									
	Andersonia sp.							x		x							
	Astartea scoparia				x												
	Asteraceae sp.								x								
	Asterolasia pallida								x								
	Astroloma ciliatum	x	x	x				x	x		x	x	x	x	x	x	x
	Astroloma pallidum	x	x	x				x	x	x	x	x	x	x	x		
	Astroloma sp.		x														
	Austrostipa sp.			x													
	Babingtonia camphorosmae			x		x		x	x	x	x	x					
	Banksia armata							x									
	Banksia dallanneyi subsp. *dallanneyi*		x	x		x	x	x	x	x	x	x	x	x	x	x	
	Banksia grandis	x	x	x	x			x	x	x	x	x	x	x	x	x	x
	Banksia littoralis		x		x					x							
	Banksia sessilis			x								x	x	x	x		
	Banksia sp.														x		
	Banksia sphaerocarpa									x	x	x	x		x		
	Banksia undata								x								
	Billardiera fusiformis		x										x				
	Billardiera sp.							x	x	x							
	Billardiera variifolia				x			x	x						x		
	Boronia crenulata			x											x		
	Boronia fastigiata	x	x	x		x		x	x	x	x	x	x	x	x	x	x
	Boronia molloyae				x												
	Borya sphaerocephala							x	x			x			x		
	Bossiaea aquifolium subsp. *aquifolium*	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x
	Bossiaea ornata		x			x		x		x	x	x	x	x	x		x
	Burchardia congesta						x	x	x						x		
	Calothamnus quadrifidus											x		x	x		
	Calothamnus sanguineus								x								
	Calytrix ?depressa											x					
	Calytrix sp.							x	x	x	x	x	x		x		
	Cassytha sp.				x			x	x	x					x		

APPENDIX D: VASCULAR PLANT SPECIES RECORDED BY SITE-VEGETATION TYPE WITHIN THE EASTERN HUNTLY EXPANSION SURVEY AREAS

Note: * denotes introduced species, P1 to P4 denotes Priority Flora species (DBCA 2019a)

		Site-Vegetation Type														
	Species	**T**	**TS**	**W**	**CW**	**D**	**DG**	**R**	**G**	**E**	**PW**	**P**	**PS**	**SP**	**S**	**SW**	**ST**
	Centrolepis sp.								x								
	Chorizema cordatum		x	x	x			x			x	x	x	x	x		x
	Clematis pubescens	x	x	x	x			x	x		x		x		x		x
	Comesperma calymega													x			
	Comesperma virgatum							x					x	x	x		
	Conostylis pusilla							x					x		x		
	Conostylis serrulata					x				x	x	x	x		x		
	Conostylis setigera	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
	Conostylis setosa			x									x		x	x	
	*Conostylis s*p.							x			x	x	x		x		
*	*Conyza* sp.								x								
	Corymbia calophylla	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Cyathochaeta avenacea							x							x		
	Dampiera hederacea				x					x							
	Dampiera linearis							x									
	Darwinia citriodora					x	x	x	x	x							
	Daviesia cordata											x		x	x		
	Daviesia decurrens												x				
	Daviesia horrida							x			x				x		x
	Daviesia preissii											x	x		x		
	Daviesia sp.							x									
	Desmocladus fasciculatus		x	x				x	x				x	x	x	x	
	Desmocladus flexuosus	x	x	x	x					x	x	x	x	x	x		
	Desmocladus sp.		x									x					
	Dianella revoluta											x			x		
	Dichopogon preissii		x														
*	*Dittrichia graveolens*								x								
	Dodonaea ceratocarpa								x								
	Drosera sp.							x				x					
	Erodium sp.								x								
	Eucalyptus marginata	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Eucalyptus megacarpa				x							x					
	Eucalyptus patens			x	x	x				x	x						
	Eucalyptus rudis				x												
	Gahnia aristata								x								
	Gahnia decomposita				x					x							
	Gastrolobium villosum					x		x	x	x	x	x	x		x		
	Glischrocaryon aureum								x		x		x		x	x	
	Gompholobium knightianum									x	x	x	x				
	Gompholobium marginatum					x	x	x	x	x	x	x	x		x		
	Gompholobium polymorphum			x									x	x	x	x	
	Gompholobium preissii					x		x	x	x	x	x	x		x		
	Gompholobium tomentosum										x						
	Gonocarpus benthamii subsp. *benthamii* ms				x					x							
	Grevillea bipinnatifida					x	x	x	x		x						
	Grevillea manglesii subsp. *manglesii*				x												
	Grevillea pimeleoides (P4)								x								
	Grevillea pulchella				x	x		x	x	x	x	x	x	x	x	x	x
	Grevillea wilsonii	x		x		x	x	x	x	x	x	x	x	x	x		
	Hakea amplexicaulis							x			x	x					
	Hakea cyclocarpa										x	x	x		x		
	Hakea incrassata							x							x		
	Hakea lissocarpha		x	x		x	x	x	x	x	x	x	x	x	x	x	x
	Hakea petiolaris							x	x								

APPENDIX D: VASCULAR PLANT SPECIES RECORDED BY SITE-VEGETATION TYPE WITHIN THE EASTERN HUNTLY EXPANSION SURVEY AREAS

Note: * denotes introduced species, P1 to P4 denotes Priority Flora species (DBCA 2019a)

		Site-Vegetation Type														
	Species	**T**	**TS**	**W**	**CW**	**D**	**DG**	**R**	**G**	**E**	**PW**	**P**	**PS**	**SP**	**S**	**SW**	**ST**
	Hakea ruscifolia							x			x	x	x	x	x		
	Hakea undulata							x	x		x	x			x		
	Hakea varia								x								
	Hemigenia ?incana								x								
	Hemigenia pritzelii		x					x	x			x		x	x		
	Hemiphora bartlingii										x	x					
	Hibbertia acerosa			x								x	x	x	x	x	
	Hibbertia amplexicaulis	x	x			x		x	x	x	x	x	x	x	x	x	x
	Hibbertia commutata	x	x	x		x		x	x	x	x	x	x	x	x		
	Hibbertia ovata	x		x								x		x	x		
	Hibbertia perfoliata	x	x					x	x		x	x	x		x		
	Hibbertia silvestris											x	x				
	Hibbertia sp.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Hovea chorizemifolia		x							x	x	x	x	x	x		
	Hovea trisperma		x					x		x	x	x	x	x	x		
	Hypocalymma angustifolium		x	x	x	x	x	x	x	x	x	x		x		x	
	Hypocalymma cordifolium									x							
	Hypocalymma robustum		x										x		x		
	Indeterminate					x									x		
	Isopogon dubius												x				
	Isopogon sp. Darling Range (F. Hort 1662)									x	x	x					
	Isopogon sphaerocephalus														x		
	Isotropis cuneifolia subsp. *cuneifolia*										x						
	Kennedia coccinea	x							x			x	x		x		
	Kennedia prostrata							x	x								
	Kingia australis									x	x	x	x				
	Kunzea glabrescens								x					x			
	Labichea punctata							x					x				
	Lasiopetalum cardiophyllum (P4)						x							x	x		
	Lasiopetalum floribundum	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Lasiopetalum glabratum		x		x								x				
	Laxmannia grandiflora								x								
	Lechenaultia biloba		x					x	x		x	x	x	x	x		
	Lepidosperma pubisquameum											x					
	Lepidosperma sp.				x												
	Lepidosperma squamatum				x						x						
	Lepidosperma tenue								x								
	Lepidosperma tetraquetrum				x					x							
	Lepidosperma tuberculatum								x								
	Leptomeria cunninghamii					x									x		
	Leptospermum erubescens							x	x	x	x	x					
*	*Leptospermum laevigatum*													x			
	Leucopogon capitellatus	x	x			x		x	x	x	x	x	x	x	x		
	Leucopogon nutans	x			x				x	x		x	x	x	x		
	Leucopogon propinquus	x	x	x				x	x	x		x	x	x	x	x	x
	Leucopogon sp.							x	x	x			x				
	Leucopogon verticillatus	x	x					x	x	x				x	x		
	Lindsaea linearis									x							
	Lobelia sp.				x			x	x						x		x
	Lomandra drummondii	x	x	x									x	x	x		
	Lomandra hermaphrodita		x	x		x		x	x	x	x	x	x	x	x	x	
	Lomandra micrantha		x					x	x	x	x	x	x	x	x		
	Lomandra preissii											x		x			
	Lomandra purpurea								x								

APPENDIX D: VASCULAR PLANT SPECIES RECORDED BY SITE-VEGETATION TYPE WITHIN THE EASTERN HUNTLY EXPANSION SURVEY AREAS

Note: * denotes introduced species, P1 to P4 denotes Priority Flora species (DBCA 2019a)

	Site-Vegetation Type															
Species	**T**	**TS**	**W**	**CW**	**D**	**DG**	**R**	**G**	**E**	**PW**	**P**	**PS**	**SP**	**S**	**SW**	**ST**
Lomandra sericea							x				x	x	x	x	x	
Lomandra sonderi	x	x		x				x	x	x	x	x	x	x		
Lomandra sp.	x	x	x	x	x		x	x	x	x	x	x	x	x	x	
Lomandra spartea	x	x			x		x	x	x	x	x	x	x	x		
Loxocarya cinerea							x									
Loxocarya striata										x						
Macrozamia riedlei	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Malvaceae sp.								x		x		x		x		
Marianthus drummondianus					x		x	x			x			x	x	
Marianthus tenuis								x				x		x		
Melaleuca ?parviceps							x	x	x	x	x	x				
Melaleuca ?trichophylla							x	x	x	x	x	x		x		
Melaleuca viminea				x												
Mesomelaena tetragona									x		x					
Mirbelia dilatata		x	x	x		x	x	x						x		
Monotaxis occidentalis							x		x		x	x		x		
Neurachne alopecuroidea						x	x	x			x		x	x		
Opercularia echinocephala		x	x	x	x		x	x		x	x	x	x	x		x
Paraserianthes lophantha													x			
Patersonia occidentalis	x		x		x		x			x	x	x	x	x		
Patersonia pygmaea							x									
Patersonia rudis					x											
Pentapeltis peltigera	x	x	x		x					x	x	x	x	x	x	
Pericalymma ellipticum							x	x								
Persoonia angustiflora										x	x					
Persoonia elliptica	x						x		x		x	x	x	x		
Persoonia longifolia	x	x	x	x	x		x	x		x	x	x	x	x	x	x
Petrophile serruriae							x	x	x		x			x		
Petrophile sp.								x				x				
Petrophile striata								x	x	x	x	x				
Philotheca spicata		x					x									
Phyllanthus calycinus	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Pimelea ciliata														x		
Pimelea sp.					x		x	x		x				x		
Platysace compressa	x	x	x	x			x		x	x	x	x	x	x	x	x
Platysace filiformis	x	x									x					
Platysace tenuissima		x							x		x	x				
Pteridium esculentum	x	x	x	x				x	x				x			x
Pterochaeta paniculata						x	x	x	x	x	x		x			
Ranunculus colonorum							x			x						
Rutaceae sp.							x									
Rytidosperma caespitosum			x		x		x	x	x	x		x		x		
Scaevola calliptera							x		x				x			
Senecio diaschides		x					x	x						x		
Senecio leucoglossus (P4)								x								
Senecio quadridentatus			x					x				x		x		
Senecio sp.		x						x			x	x		x		
Sphaerolobium medium		x					x	x		x		x		x		
Stirlingia simplex										x	x					
Stylidium amoenum					x	x	x		x	x		x		x		x
Stylidium ciliatum														x		
Stylidium dichotomum														x		
Stylidium piliferum							x							x		
Stylidium repens								x	x	x						

APPENDIX D: VASCULAR PLANT SPECIES RECORDED BY SITE-VEGETATION TYPE WITHIN THE EASTERN HUNTLY EXPANSION SURVEY AREAS

Note: * denotes introduced species, P1 to P4 denotes Priority Flora species (DBCA 2019a)

	Site-Vegetation Type															
Species	**T**	**TS**	**W**	**CW**	**D**	**DG**	**R**	**G**	**E**	**PW**	**P**	**PS**	**SP**	**S**	**SW**	**ST**
Stylidium sp.		x					x		x	x	x					
Styphelia tenuiflora			x				x		x	x	x	x	x	x	x	
Synaphea sp.							x	x			x	x		x		
Taxandria linearifolia				x	x		x		x							
Tetraria capillaris	x	x		x	x		x	x	x	x	x	x	x	x		x
Tetraria octandra							x					x		x		
*Tetraria s*p. Jarrah Forest (R. Davis 7391)	x	x	x	x	x		x	x	x	x	x	x	x	x	x	
Tetrarrhena laevis	x	x	x				x	x	x	x	x	x	x	x		
Tetratheca hirsuta	x	x			x		x	x		x		x	x	x		
Thomasia ?macrocalyx				x												
?Thomasia sp.							x	x	x	x	x			x		x
Thysanotus dichotomus	x	x		x						x	x			x		
Thysanotus fastigiatus							x		x	x	x	x	x	x		
Thysanotus multiflorus	x	x					x	x	x	x	x	x	x	x		
Trichocline spathulata						x										
Tricoryne sp.							x		x	x	x					
Trymalium ledifolium			x		x	x	x	x	x	x	x	x	x	x	x	x
Trymalium odoratissimum subsp. *odoratissimum*	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
*Verticordia plumosa v*ar. *plumosa*								x								
Xanthorrhoea gracilis	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x
Xanthorrhoea preissii	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Xanthosia atkinsoniana		x					x					x	x	x		
Xanthosia candida				x			x					x	x	x		
Xanthosia huegelii					x						x					

APPENDIX E: LOCATION OF ACACIA SP. (POTENTIAL NEW SPECIES) ON EASTERN HUNTLY EXPANSION SURVEY AREAS

Note: Potential new *Acacia* species collected near and on the granite outcrops.

GPS Datum	GPS E	GPS N	*Species*	Population	Area (m x m)	Condition	Reprod. Stage
50H	427541	6408599	*Acacia* sp. (potential new species)	10	10x10	H	Frt
50H	427560	6408632	*Acacia* sp. (potential new species)	50	50x30	H	Frt
50H	427548	6408695	*Acacia* sp. (potential new species)	4	5x5	H	Frt
50H	427533	6408716	*Acacia* sp. (potential new species)	2	3x2	H	Frt
50H	427529	6408733	*Acacia* sp. (potential new species)	2	5x2	H	Frt
50H	427511	6408738	*Acacia* sp. (potential new species)	5	10x10	H	Frt
50H	427494	6408758	*Acacia* sp. (potential new species)	2	5x2	H	Frt
50H	427444	6408646	*Acacia* sp. (potential new species)	1		H	Frt
50H	427481	6408642	*Acacia* sp. (potential new species)	2		H	Frt
50H	427491	6408643	*Acacia* sp. (potential new species)	1		H	Frt
50H	427517	6408639	*Acacia* sp. (potential new species)	1		H	Frt
50H	427645	6408662	*Acacia* sp. (potential new species)	6	10x10	H	Frt
50H	427653	6408634	*Acacia* sp. (potential new species)	1		H	Frt
50H	427933	6408620	*Acacia* sp. (potential new species)	15	15x10	H	Frt
50H	427954	6408623	*Acacia* sp. (potential new species)	10	10x5	H	Frt
50H	427972	6408630	*Acacia* sp. (potential new species)	2	2x2	H	Frt
50H	427991	6408618	*Acacia* sp. (potential new species)	1		H	Frt
50H	427983	6408601	*Acacia* sp. (potential new species)	4	5x3	H	Frt
50H	428341	6408216	*Acacia* sp. (potential new species)	10	10x10	H	Frt
50H	428362	6408157	*Acacia* sp. (potential new species)	40	40x40	H	Frt
50H	427989	6408752	*Acacia* sp. (potential new species)	1		H	Frt
50H	427975	6408774	*Acacia* sp. (potential new species)	1		H	Frt
50H	427955	6408786	*Acacia* sp. (potential new species)	30	50x50	H	Frt
50H	427909	6408776	*Acacia* sp. (potential new species)	1000	150x50	SS/S	Frt
50H	427862	6408858	*Acacia* sp. (potential new species)	500	100x50	SS	Frt
50H	427797	6408879	*Acacia* sp. (potential new species)	1000	150x50	SS	Frt
50H	427818	6408790	*Acacia* sp. (potential new species)	1000	150x50	SS	Frt
50H	427863	6408802	*Acacia* sp. (potential new species)	250	50x50	SS	Frt
50H	427897	6408808	*Acacia* sp. (potential new species)	500	100x50	SS	Frt
50H	427936	6408590	*Acacia* sp. (potential new species)	35	20x20	H	Frt
50H	427941	6408575	*Acacia* sp. (potential new species)	25	20x20	H	Frt
50H	427947	6408551	*Acacia* sp. (potential new species)	1	2x2	H	Frt
50H	427976	6408548	*Acacia* sp. (potential new species)	3	10x10	H	Frt
50H	428002	6408575	*Acacia* sp. (potential new species)	1	1x1	H	Frt
50H	428004	6408587	*Acacia* sp. (potential new species)	3	4x4	H	Frt
50H	428269	6408416	*Acacia* sp. (potential new species)	1	1x2	H	Frt
50H	428304	6408295	*Acacia* sp. (potential new species)	14	10x20	H	Frt
50H	428312	6408281	*Acacia* sp. (potential new species)	2	4x4	H	Frt
50H	428307	6408268	*Acacia* sp. (potential new species)	1	1x1	H	Frt
50H	428356	6408226	*Acacia* sp. (potential new species)	10	10x10	H	Frt
50H	428365	6408217	*Acacia* sp. (potential new species)	11	10x10	H	Frt
50H	428357	6408206	*Acacia* sp. (potential new species)	15	10x10	H	Frt
50H	427983	6408695	*Acacia* sp. (potential new species)	5	5x10	H	Frt
50H	427936	6408747	*Acacia* sp. (potential new species)	9	10x10	H	Frt
50H	427951	6408803	*Acacia* sp. (potential new species)	40	50x50	H	Frt
50H	427932	6408851	*Acacia* sp. (potential new species)	14	20x10	H	Frt
50H	427901	6408860	*Acacia* sp. (potential new species)	20	50x50	H	Frt
50H	427881	6408878	*Acacia* sp. (potential new species)	16	20x20	H	Frt
50H	427886	6408938	*Acacia* sp. (potential new species)	8	10x10	H	Frt
50H	427518	6408742	*Acacia* sp. (potential new species)	3	10x10	H	Frt
50H	427875	6408874	*Acacia* sp. (potential new species)	4	10x10	H	Frt
50H	427990	6408744	*Acacia* sp. (potential new species)	1	10x10	H	Frt
50H	427992	6408626	*Acacia* sp. (potential new species)	1	10x10	H	Frt

ASSESSMENT OF FLORA AND VEGETATION VALUES

ALCOA OF AUSTRALIA MYARA EAST SURVEY AREA, WA

Prepared By

Mattiske Consulting Pty Ltd

Prepared For

Alcoa of Australia Limited

July 2021

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0LIST OF ABBREVIATIONS

BAM Act: *Biosecurity and Agriculture Management Act 2007* (WA)

BC Act: *Biodiversity Conservation Act 2016* (WA)

BOM: Bureau of Meteorology

DAWE: Department of Agriculture, Water and the Environment

DBCA: Department of Biodiversity, Conservation and Attractions

EP Act: *Environmental Protection Act 1986* (WA)

EPA: Environmental Protection Authority

EPBC Act: *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

MCPL: Mattiske Consulting Pty Ltd

IBRA: Interim Biogeographical Regionalisation for Australia

PEC: Priority ecological community

TEC: Threatened ecological community

WAH: Western Australian Herbarium (PERTH)

EXECUTIVE SUMMARY

Mattiske Consulting Pty Ltd was commissioned in 2021 by Alcoa of Australia Ltd (Alcoa) to initially conduct a desktop assessment to evaluate the potential flora and vegetation values at the Myara East survey area approximately 60 km south east of Perth, WA. This latter desktop assessment was then followed by detailed mapping of the areas within the Myara East survey area. The Myara East survey area consists of one polygon located in the Huntly Mine bauxite mining operation within tenement ML 1SA. The Myara East survey area has been assessed by Mattiske Consulting Pty Ltd at a regional mapping scale as part of the Regional Forest Agreement (RFA) project by Mattiske and Havel (1998).

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

The Myara 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 by Heddle *et al.* (1980) and Mattiske and Havel (1998).

Potential Flora Values

A total of 1454 vascular plant taxa, representative of 411 genera and 108 families, have the potential to occur within the wider Myara survey areas. The most commonly represented families were Fabaceae (175 taxa), Proteaceae (121 taxa) and Myrtaceae (111 taxa). The most commonly represented genera in the Myara wider areas were *Acacia* (61 taxa), *Stylidium* (45 taxa) and *Drosera* (37 taxa).

A total of 192 introduced taxa have the potential to occur in the wider Myara survey areas. Ten of the introduced species are declared pest organisms pursuant to section 22 of the BAM Act. A further four of the introduced species are declared pest organisms pursuant to section 22 of the BAM Act, and are also listed as prohibited organisms pursuant to section 12 of the BAM Act. Ten of the introduced taxa are listed Weeds of National Significance. Another 12 of the introduced plant taxa with the potential to occur in the wider Myara survey areas have both High ecological impact and Rapid invasiveness ratings.

Recorded Flora Values

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

A total of 288 taxa from 47 families and 119 genera was recorded in the Myara East survey area and as such partly reflects the smaller survey area. Of the 288 species, 9 were introduced or planted species. Of interest is the occurrence of **Selago corymbosa* which appears to be a garden escape (identification confirmed at State Herbarium by M. Hislop).

Only two Priority 4 species (*Lasiopetalum cardiophyllum* and *Senecio leucoglossus*) were recorded in the Myara East survey area.

Potential Vegetation Values

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

One of the priority ecological communities (PECs), as listed at State level by DBCA (2020a) occurs near the Myara East survey area, namely:

- Granite communities of the northern Jarrah forest (P3)

- Jarrahdale area – Monadnocks, Blue Rock; insufficient information to distinguish discrete community type/s (DBCA 2020a).

There is a potential that the site-vegetation types associated with granite outcrops (site-vegetation types G and R), and the Cooke vegetation complex as defined by Mattiske and Havel (1998) will have affinities with the PEC.

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

Recorded Vegetation Values

A total of 19 site-vegetation types have been recorded on the Myara East survey area. The site-vegetation types were subdivided into six main groupings associated with site conditions which reflected landforms, soils and soil moisture levels. The site-vegetation types on the extreme sites such as outcrops and broad valley systems and swamps differ markedly from the forest and woodland areas on the slopes and ridges.

Potential Groundwater Dependent Ecosystems

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

Potential Old Growth Forest Areas

There are a number of patches of old growth forests occurring in the area surrounding the Myara East survey area; however based on data supplied by the Department of Biodiversity, Conservation and Attractions no areas have been highlighted within the Myara East survey area.

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

1. INTRODUCTION

Mattiske Consulting Pty Ltd was commissioned in early 2022 by Alcoa of Australia Ltd (Alcoa) to initially conduct a desktop assessment to evaluate the potential flora and vegetation values of the Myara East survey area approximately 60 km south east of Perth, WA. This desktop assessment was then followed by detailed mapping of the areas within the Myara East survey area.

1.1. Location and Scope of Project

The Myara East survey area lies within the Northern Jarrah Forest subregion of the Southwest Botanical Province (Beard 1990), approximately 60 km south east of Perth, WA (Figure 1). The Myara East survey area consists of one polygon located in the Huntly Mine bauxite mining operation within tenement ML 1SA and located south-east of Serpentine Dam (Figure 1).

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

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

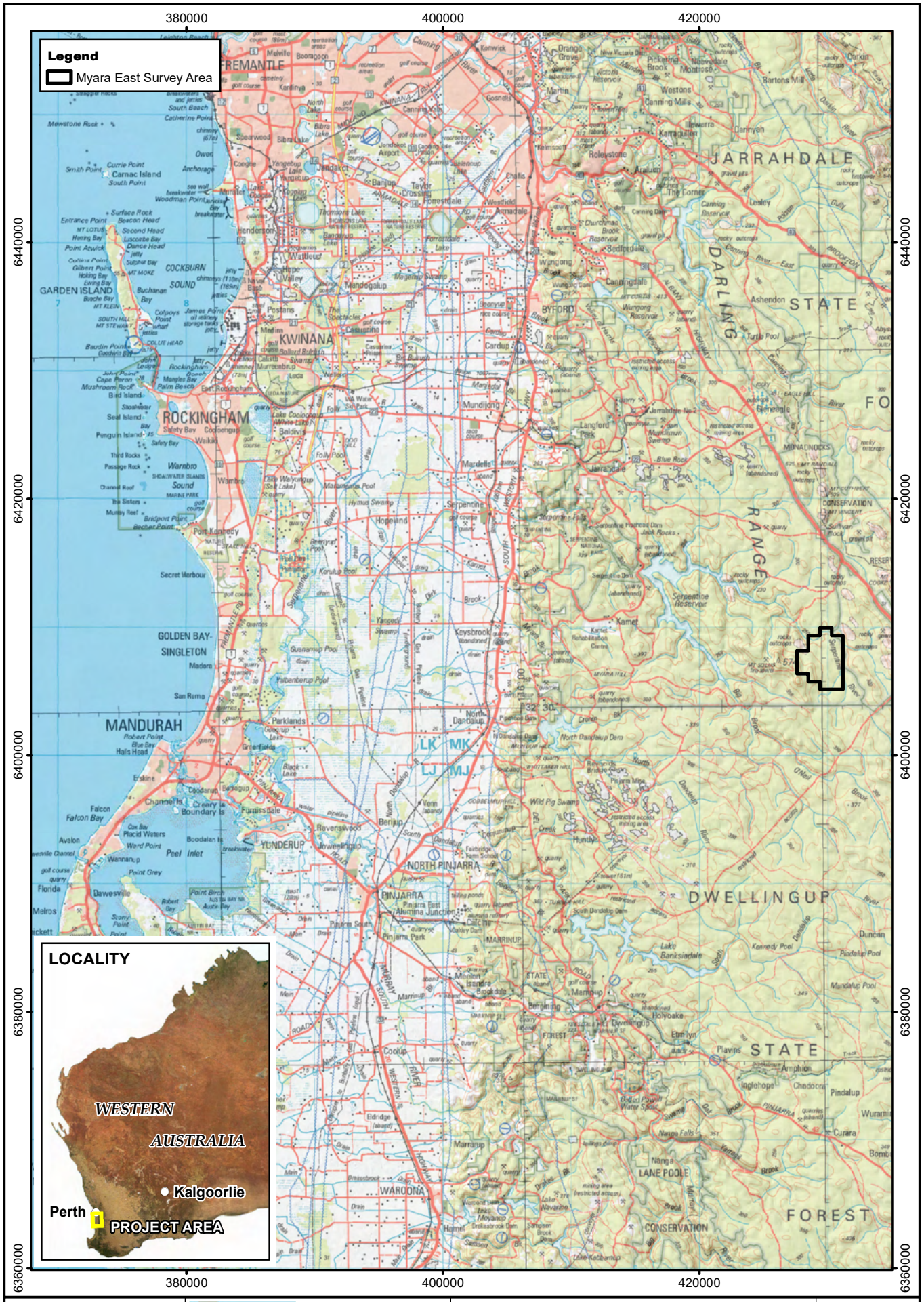
The following key Western Australian (state) legislation relevant to this survey includes the:

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

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



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0 3 6 km

Scale: 1:400,000
MGA94 (Zone 50)

CAD Ref: a1992_MyEst_F02_01

Date: July 2022 | Rev: A | A4

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Myara East Survey Area
Location

Figure: **1**

2. OBJECTIVES

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

- Undertake a desktop assessment of the flora and vegetation of the Myara East survey area, with an emphasis on threatened and priority flora, and threatened and priority ecological communities;
- Undertake a detailed assessment of the flora and vegetation of the Myara 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 Myara East survey area;
- Review the conservation status of the vascular plant species recorded by reference to current literature and current listings by the Department of Biodiversity, Conservation and Attractions (DBCA 2022a, 2022c) and plant collections held at the Western Australian Herbarium ([WAH] 1998 -), and plants listed by the Department of Agriculture, Water and the Environment [DAWE] (2022a) 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 (DAWE 2020b) databases were used to identify the possible occurrence of flora (including threatened and priority taxa) and threatened and priority ecological communities within the Myara East survey area. The vascular plant species recorded through this database search are summarized in Appendices B and C.

The TPFL database of threatened and priority flora and ecological communities and the Western Australian Herbarium (WAH) database (DBCA 2022b) were arranged by CAD Resources (Carine, WA). In addition, any flora recorded by Mattiske Consulting Pty Ltd (1991-2021) within or adjacent to the survey area were included.

In addition, historical documentation and vegetation mapping of the Northern Jarrah forest subregion that provide resource material for the floristics and vegetation of the Myara areas was reviewed, including Mattiske Consulting Pty Ltd's (1991-2021) reports on their flora and vegetation surveys in the nearby Myara survey areas. Nomenclature of flora species was checked against and is consistent with Florabase (WAH 1998-).

3.2. Field studies

Field studies were undertaken at 960 sites on the 120m grid systems within the 1296 ha of the Myara East survey area. Data was recorded for the following parameters:

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 120 x 120 m grid system overlaid on the survey area. A total of 960 sites within the 1296ha area were assessed with recordings on the trees (20m radius) and understorey (5m radius). Additional targeted work was undertaken on the areas between the recording sites and also on specific areas such as the outcrop and sandier valley systems and creeklines.

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

The following information was recorded at each vegetation assessment site:

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

4. DESKTOP FINDINGS

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

4.1. Climate

The survey area lies at the southern end of the Northern Jarrah Forest subregion. Beard (1990) described the climate of this area as being warm Mediterranean, with rainfall of 600 – 1200 mm per annum and 5 - 6 dry months per year. The closest weather station is the Jarrahdale and Karnet weather stations, approximately 1.6km and 11.1km from Jarrahdale town. Annual average rainfall at Jarrahdale (1991-2022) is 1169.7 mm (Bureau of Meteorology [BOM] 2022). Rainfall in 2021 was higher in the winter months of 2021 than the longer term mean; although the summer months were again drier (Figure 2). The monthly temperatures were similar to the longer term temperatures at Karnett.

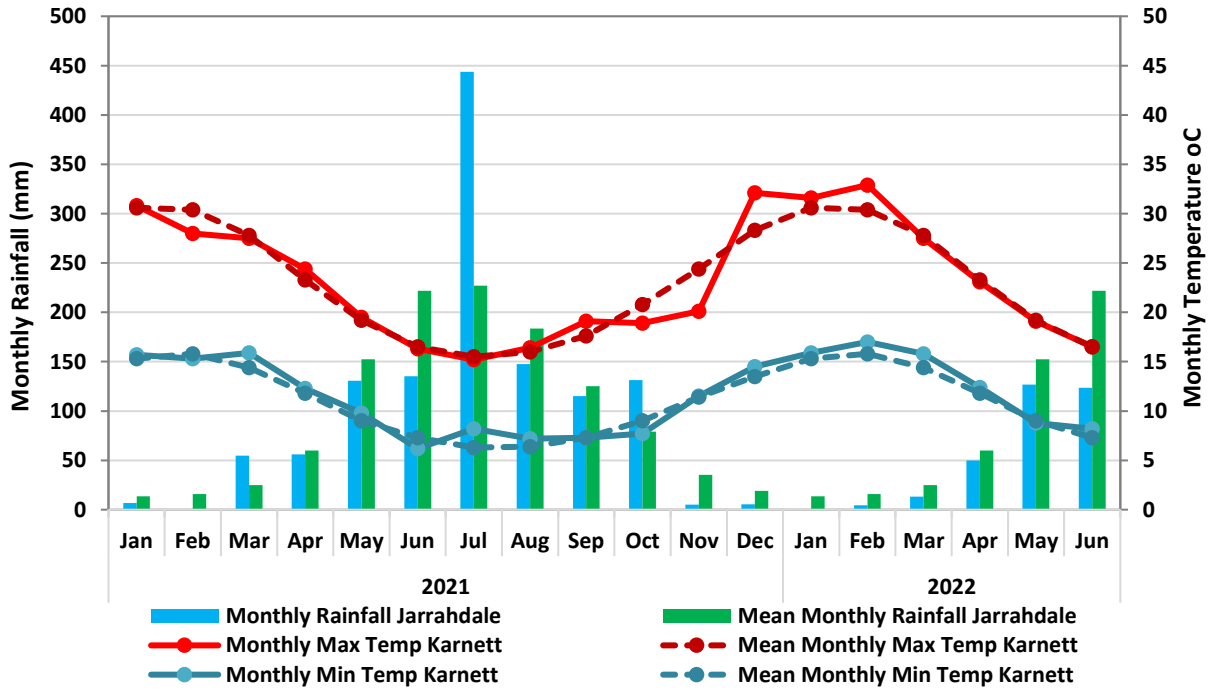
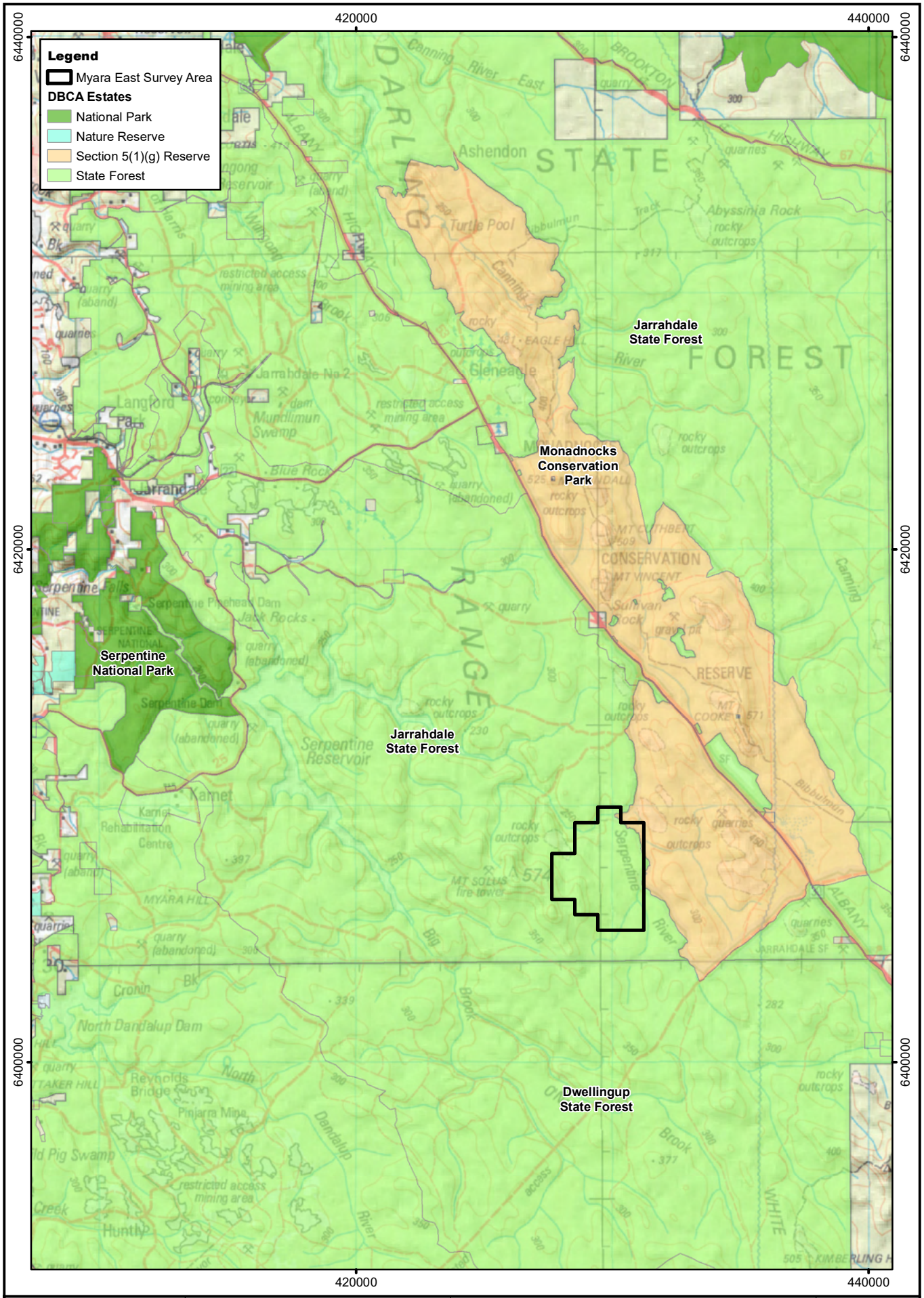


Figure 2: Climatic data for the Myara East survey area
Long term average rainfall and temperature from the Jarrahdale and Karnet weather stations respectively (ID 009023 and 009111 respectively, years 1991-2022) (BOM 2022).

4.2. DBCA Estates

The Myara East survey area is situated in State Forest, with the Monadnocks Conservation Park occurring within and adjacent to the north-eastern area of the survey area (Figure 3).



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

CAD Ref: a1992_MyEst_F02_02

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Myara East Survey Area
DBCA Estates

Figure: **3**

4.3. Geology, Soils and Topography

The Myara 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 four 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.

Murray: Deeply incised valleys with red and yellow earths on slopes; narrow alluvial terraces.

Yarragil: Valleys of the western part of the plateau; sandy gravels on the slopes; orange earth in swampy floors.

Other landform and soil units occurring in the survey area include:

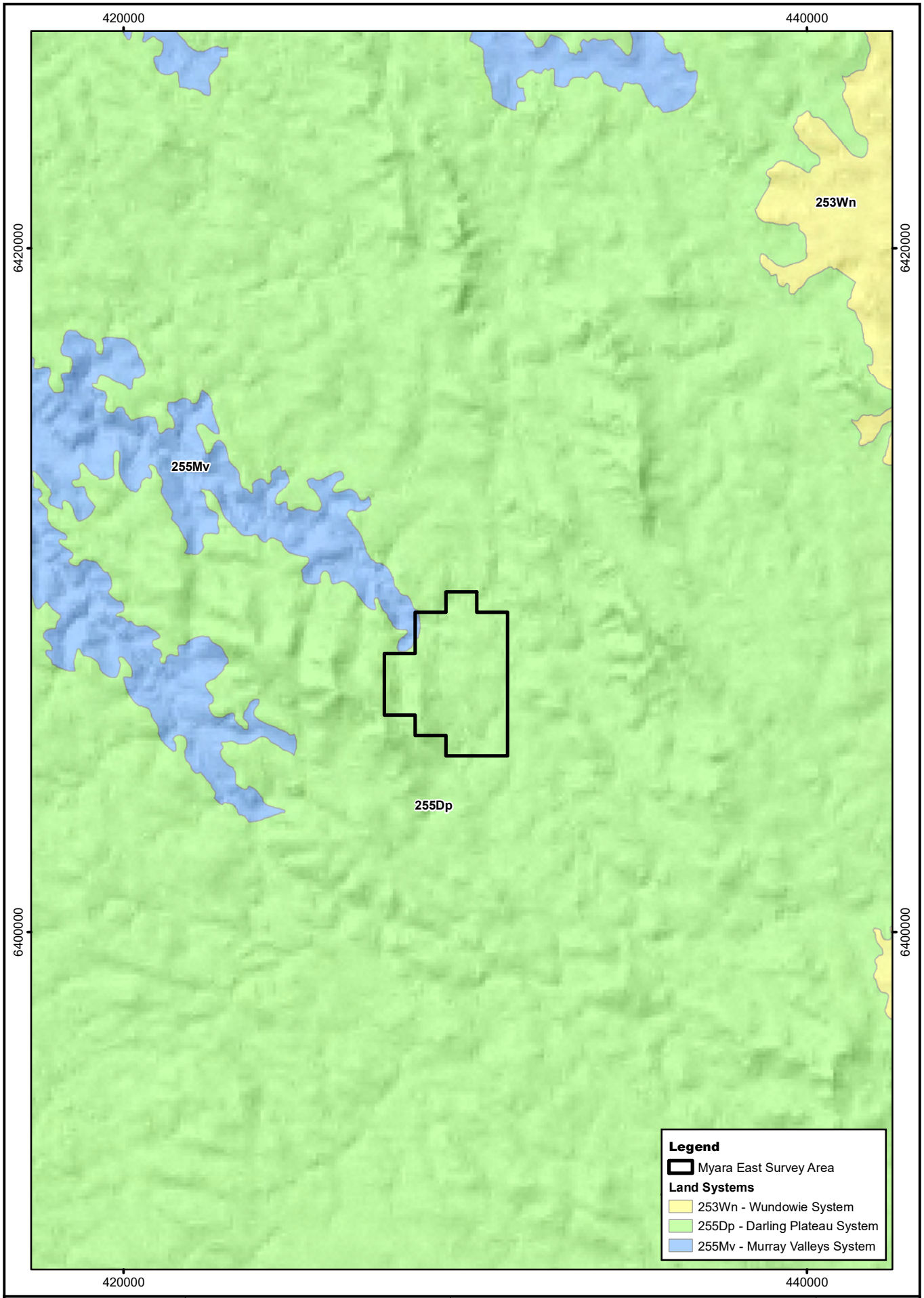
Cooke: Hills rising above general plateau level; mainly mantled by laterite with some rock outcrop.

The Department of Primary Industries and Regional Development's (DPIRD) Land Systems present within the Myara East survey area (Figure 4, Table 1) includes:

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

Table 1: Extent of Land Systems intersecting the Myara East survey area

Land System	Mapping Unit	Total Extent (ha)	Area of Intersection with the Myara East survey area	Proportion of Current Extent (%)
Darling Plateau System	255Dp	820265.76	1286.224	0.156
Murray Valleys System	255Mv	132642.63	9.661	0.007



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MGA94 (Zone 50)

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Myara East Survey Area
Landsystems

Figure: **4**

4.4. Regional Vegetation

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

The Pre-European vegetation systems present within the Myara East survey area (Figure 5, Table 2) include:

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

Table 2: Extent of pre-European vegetation associations intersecting the Myara East survey area

System	Vegetation Association	State-wide Pre-European Extent (ha)	Area of Intersection with the Myara survey area (ha)	Proportion of Current Extent (%)
West Darling	3.3	485225.883	1295.885	0.27%

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

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

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

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

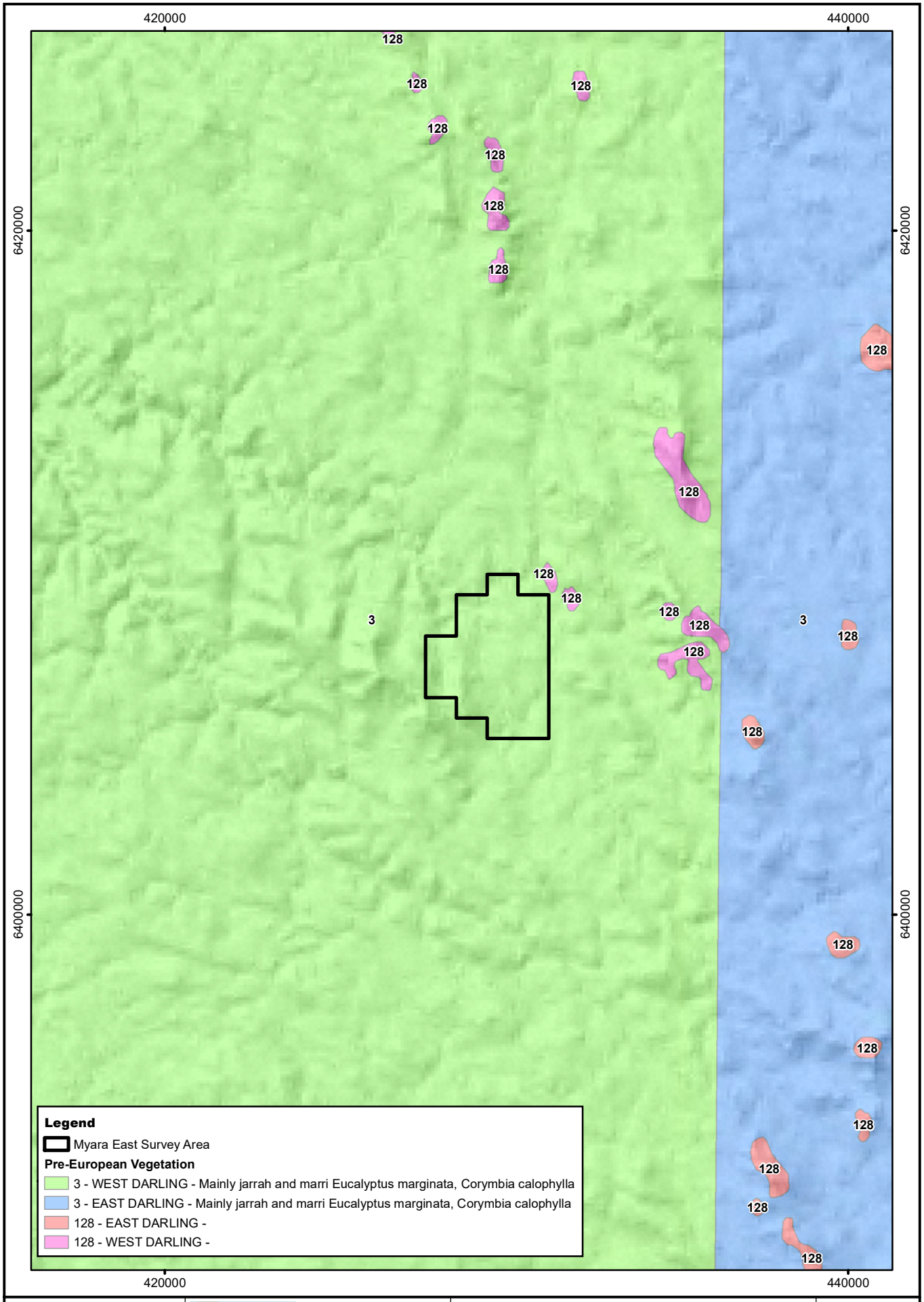
Murray 1 (My1): Open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* - *Eucalyptus patens* on valley slopes to woodland of *Eucalyptus rudis* – *Melaleuca rhaphiophylla* on the valley floors in humid and subhumid zones.

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

Table 3: Extent of Vegetation Complexes intersecting the Myara East survey area

Vegetation Complex	Vegetation Class	Total Extent (ha)	Area of Intersection with the Myara East survey area (ha)	Proportion of Current Extent (%)
Cooke	Ce	51872.10	184.567	0.36
Dwellingup 1	D1	297624.85	648.068	0.22
Dwellingup 2	D2	120755.00	0.835	0.00
Murray 1	My1	97562.81	9.642	0.01
Yarragil 1	Yg1	113828.12	452.772	0.40

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 (DAWE 2020c). 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).



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Scale: 1:150,000
MGA94 (Zone 50)

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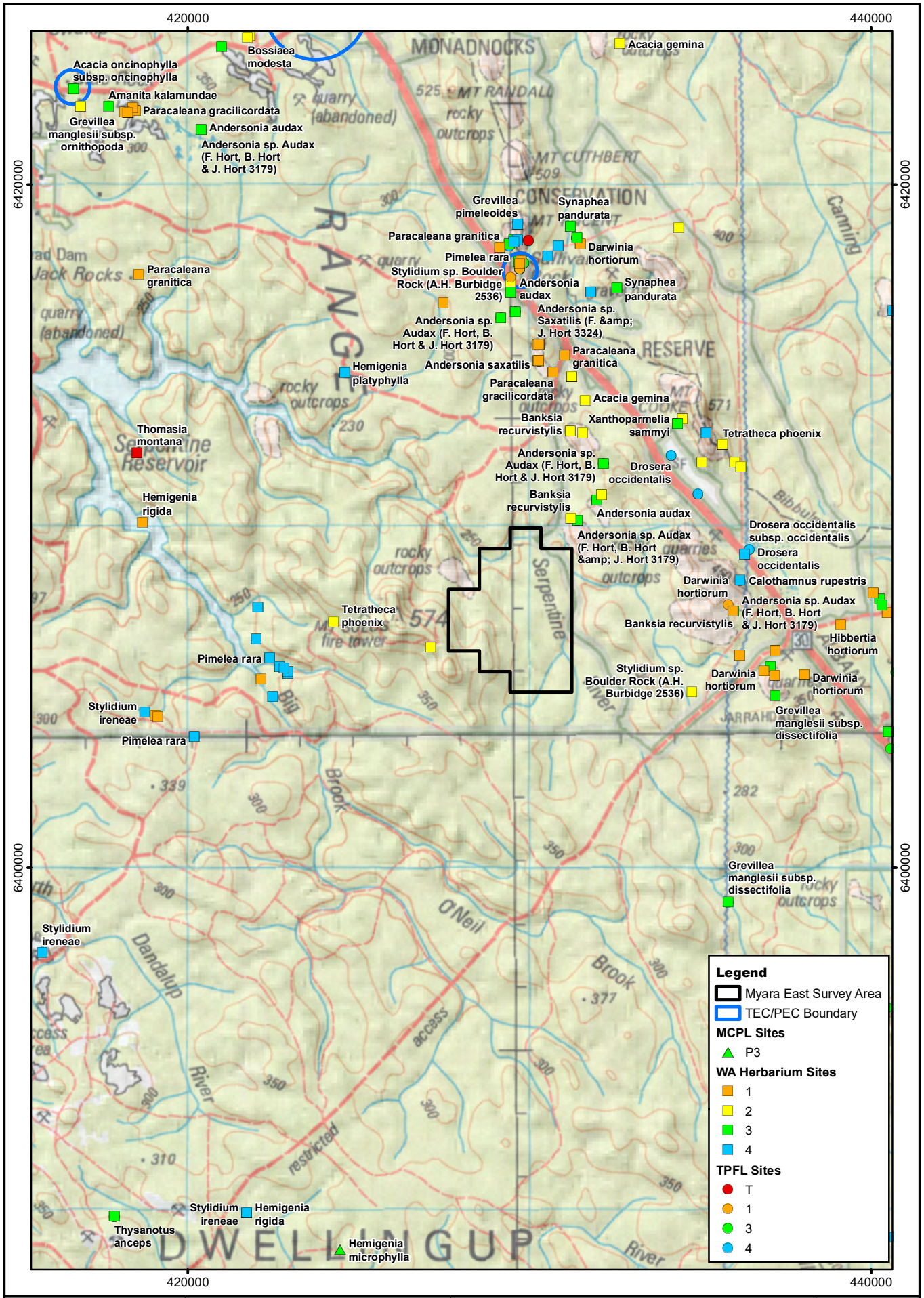
Myara East Survey Area
Pre-European Vegetation

Figure: **5**



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MGA94 (Zone 50)

CAD Ref: a1992_MyEst_F02_05

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Myara East Survey Area
Threatened & Priority Flora

Figure: **6**

4.5. Potential Flora

A total of 1454 vascular plant taxa, representative of 411 genera and 108 families, have the potential to occur within the wider Myara survey areas. The most commonly represented families were Fabaceae (175 taxa), Proteaceae (121 taxa) and Myrtaceae (111 taxa). The most commonly represented genera in the Myara wider areas were *Acacia* (61 taxa), *Stylidium* (45 taxa) and *Drosera* (37 taxa).

A total of 192 introduced taxa have the potential to occur in the wider Myara survey areas. Ten of the introduced species are declared pest organisms pursuant to section 22 of the BAM Act. A further four of the introduced species are declared pest organisms pursuant to section 22 of the BAM Act, and are also listed as prohibited organisms pursuant to section 12 of the BAM Act. Ten of the introduced taxa are listed Weeds of National Significance. Another 12 of the introduced plant taxa with the potential to occur in the wider Myara survey areas have both High ecological impact and Rapid invasiveness ratings.

4.6. Potential Threatened and Priority Flora

Five threatened flora species, pursuant to section 179 of the *EPBC Act* and as listed by DAWE (2020a) or pursuant to Part 2, Division 1 and Subdivision 2 of the *BC Act* and as listed by DBCA (2018a) have the potential to occur in the Myara East survey area. The five threatened flora species, *Anthocercis gracilis* (T & V), *Diuris micrantha* (T & V), *Diuiris purdiei* (T & E), *Lasiopetalum pterocarpum* (T & E) and *Verticordia fimbrilepis* subsp. *fimbrilepis* (T & E) had a low likelihood of occurring in the Myara East survey area (T – Threatened, V – Vulnerable and E - Endangered) due to their current known patterns of distribution.

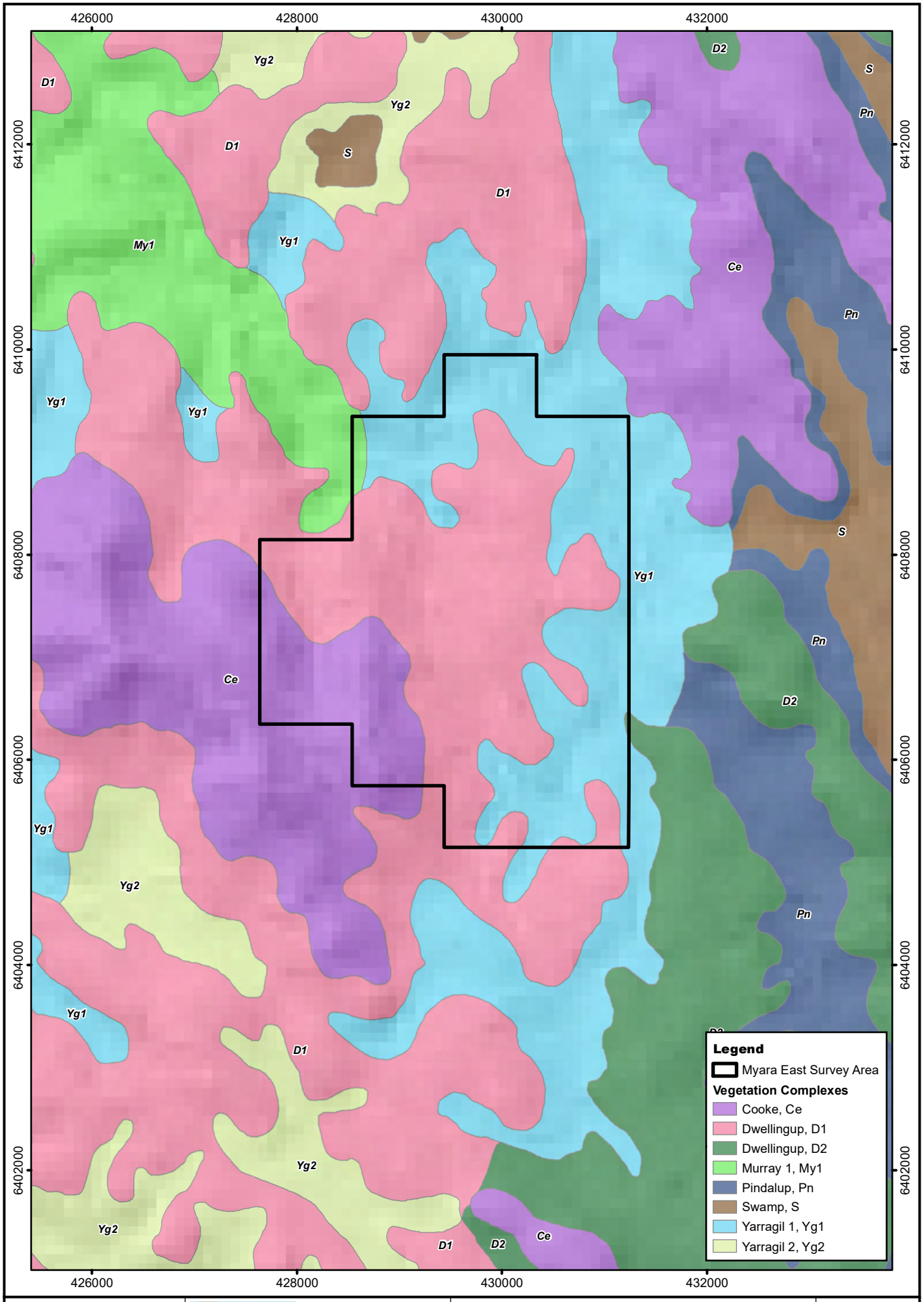
A total of 57 priority flora species as listed by DBCA (2018c) have the potential to occur within the Myara East survey area (Appendices B and C, Figure 7). All potential threatened and priority flora are listed in Appendix C, along with their State and Federal Conservation Codes (see Appendix A for definitions), a description and an assessment of the likelihood of their occurrence in the Myara Easy survey area.

The likelihood that these species would occur within the survey area 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, Appendix C. Records that have been documented either within or in close proximity of the Myara East survey area were ranked as Moderate or High

Of the 57 Priority flora species, three Priority 1, one Priority 2, one Priority 3 and 3 Priority 4 flora species had a high likelihood of occurrence, mainly due to previous records in the area and suitable habitat; whilst 2 Priority 1, 2 Priority 2, 3 Priority 3 and 4 Priority 4 flora species had a moderate likelihood of occureence (Appendix C).



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

CAD Ref: a1992_MyEst_F02_12

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Myara East Survey Area
Vegetation Complexes

Figure: **7**

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

A total of 192 introduced taxa from 51 families and 127 genera may potentially exist in the wider Myara survey area, based on NatureMap (DBCA 2007-), the *EPBC Act* Protected Matters Search Tool (DAWE 2020b) search results (Appendix D) and records from Mattiske Consulting Pty Ltd's (1991-2020) surveys. Ten of these species, * *Asparagus asparagoides*, **Gomphocarpus fruticosus*, **Moraea flaccida*, **Rubus anglocandicans*, **Rubus laudatus*, **Rubus ulmifolius*, **Rubus ulmifolius* var. *ulmifolius,* **Solanum elaeagnifolium,* **Tamarix aphylla* and **Zantedeschia aethiopica*, are declared pest organisms pursuant to section 22 of the BAM Act. A further four of the introduced species, **Chrysanthemoides monilifera*, **Chrysanthemoides monilifera* subsp. *monilifera*, **Lantana camara* and **Salvinia molesta*, are declared pest organisms pursuant to section 22 of the BAM Act, and are also listed as prohibited organisms pursuant to section 12 of the BAM Act. Ten of the introduced taxa, **Asparagus asparagoides,* **Chrysanthemoides monilifera* subsp. *monilifera,* **Genista monspessulana,* **Lantana camara,* **Lycium ferocissimum,* **Rubus fruticosus* aggregate, **Salix* spp. (except *S. babylonica*, *S.* x *calodendron* & *S.* x *reichardtii*), **Salvinia molesta,* **Solanum elaeagnifolium,* and **Tamarix aphylla,* are listed Weeds of National Significance (DAWE 2020d).

**Asparagus asparagoides*, **Moraea flaccida,* **Solanum elaeagnifolium,* **Tamarix aphylla* and **Zantedeschia aethiopica* have no control category and a declared pest organism keeping category of Exempt for the whole of Western Australia (DPIRD 2020). **Rubus anglocandicans*, **Rubus laudatus*, **Rubus ulmifolius* and **Rubus ulmifolius* var. *ulmifolius* fall into the control category of C3 –Management and have a declared pest organism keeping category of Exempt for the whole of Western Australia (DPIRD 2020). **Gomphocarpus fruticosus* falls into the control category of C3 – Management but does not have a declared pest organism keeping category. **Chrysanthemoides monilifera* subsp. *monilifera* and **Salvinia molesta* fall into the control category of C2 – Eradication and a declared pest organism keeping category of Prohibited for the whole of Western Australia (DPIRD 2020). **Chrysanthemoides monilifera* and **Lantana camara* fall into the control category of C1 – Exclusion and a declared pest organism keeping category of Prohibited for the whole of Western Australia (DPIRD 2020).

Declared pest organisms with a control category of C3 – Management should have a form of management applied that alleviate the harmful impact of the organism, reduce the numbers or distribution or prevent or contain the spread of the organism (DPIRD 2020). A declared pest category of Exempt requires no permits or conditions for keeping, although there may be other requirements under the *Biosecurity and Agriculture Management Act 2007*. Organisms in this category may also be regulated by legislation such as the *Biodiversity Conservation Act 2016* administered by DBCA (DPIRD 2020). Declared pest organisms with a control category of C1 – Exclusion should be excluded from part or all of Western Australia. Declared pest organisms with a control category of C2 – Eradication should be eradicated from part or all of Western Australia. A declared pest organism with the keeping category of Prohibited can only be kept under permit for scientific research, public display or education purposes, by entities approved by the state authority (DPIRD 2020).

An assessment of the likelihood that the 18 significant weed species (Weeds of National Significance and/or declared pest organisms) would occur within the Myara East survey area 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.

Based on this assessment, 13 of the significant weed species had a moderate likelihood, and five had a low likelihood, of occurring in the Myara East survey area.

4.8. Groundwater Dependant Ecosystems

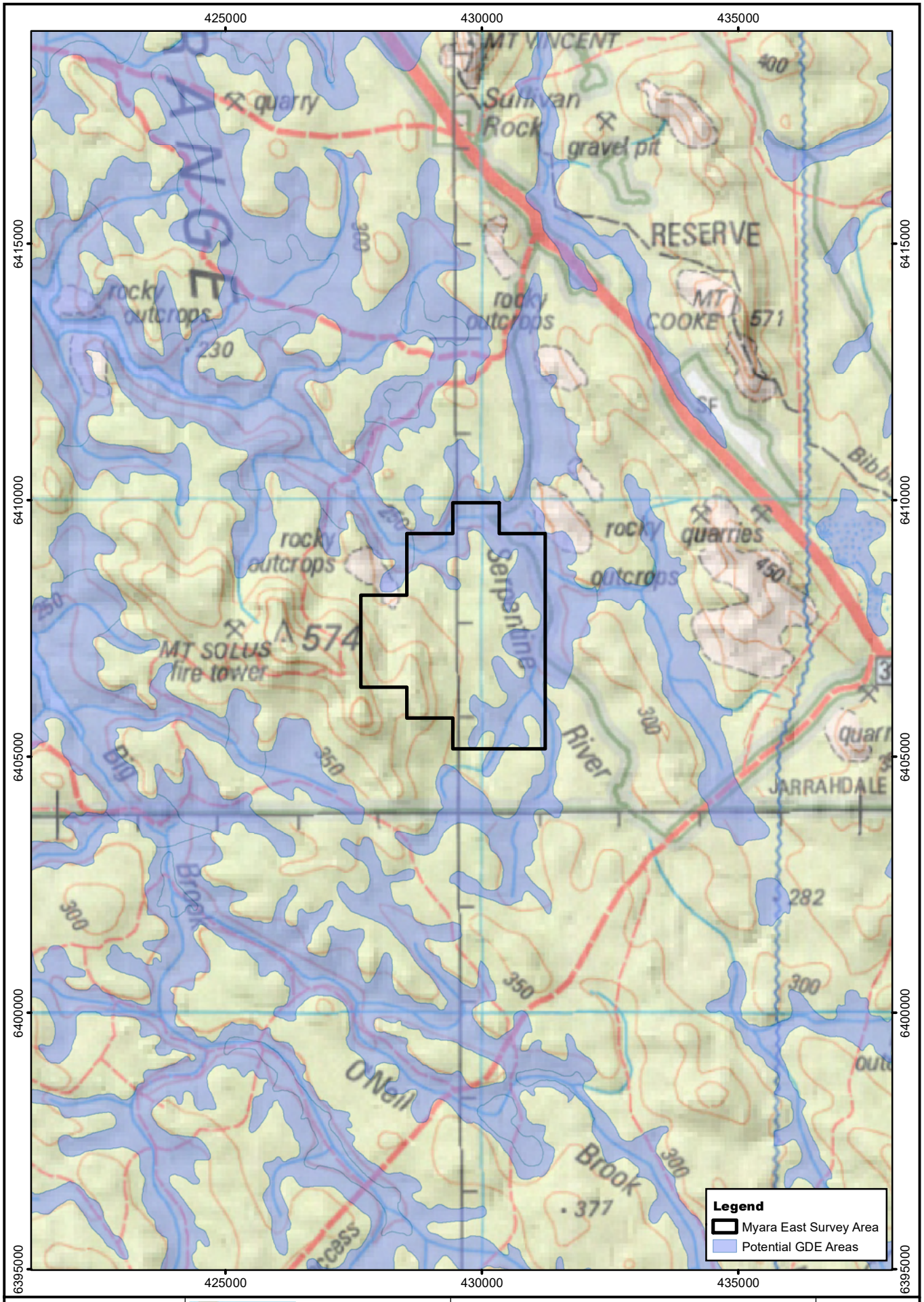
The potential groundwater dependent ecosystems were determined on the basis of the extent of the vegetation complexes (Figure 8). In view of the extensive flora and vegetation studies in the northern Jarrah Forest these vegetation complexes support species and site-vegetation types that prefer and occur on seasonally moister and wetter soils. This approach was considered to represent a precautionary approach in the absence of detailed groundwater level data at the time of selecting the potential groundwater dependent ecosystems at this juncture.

Key indicator plant species that are generally accepted as indicators of moister soils and, hence, potential groundwater dependent ecosystems include – *Banksia littoralis, Hakea varia, Acacia divergens, Pultenaea skinneri, Boronia molloyae, Thomasia paniculata, Astartea scoparia, Babingtonia camphorosmae, Calothamnus lateralis, Eucalyptus rudis, Hypocalymma angustifolium, Hypocalymma cordifolium, Melaleuca preissiana, Melaleuca rhaphiophylla, Melaleuca lateritia, Melaleuca viminea, Regelia ciliata* and *Taxandria linearifolia.*

4.9. Old Growth Forests

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

The data as presented on the history of harvesting in the area reflects the age of logging on the Myara East survey area, see Figure 10. These results as supplied by DBCA reflect the increased recent logging in the western section of the Myara East survey area and as such reflect previous activities in the area. The absence of recent logging in the central and eastern sections in part reflects the lower landforms and site-vegetation types in the eastern section associated with the Yarragil valley systems.



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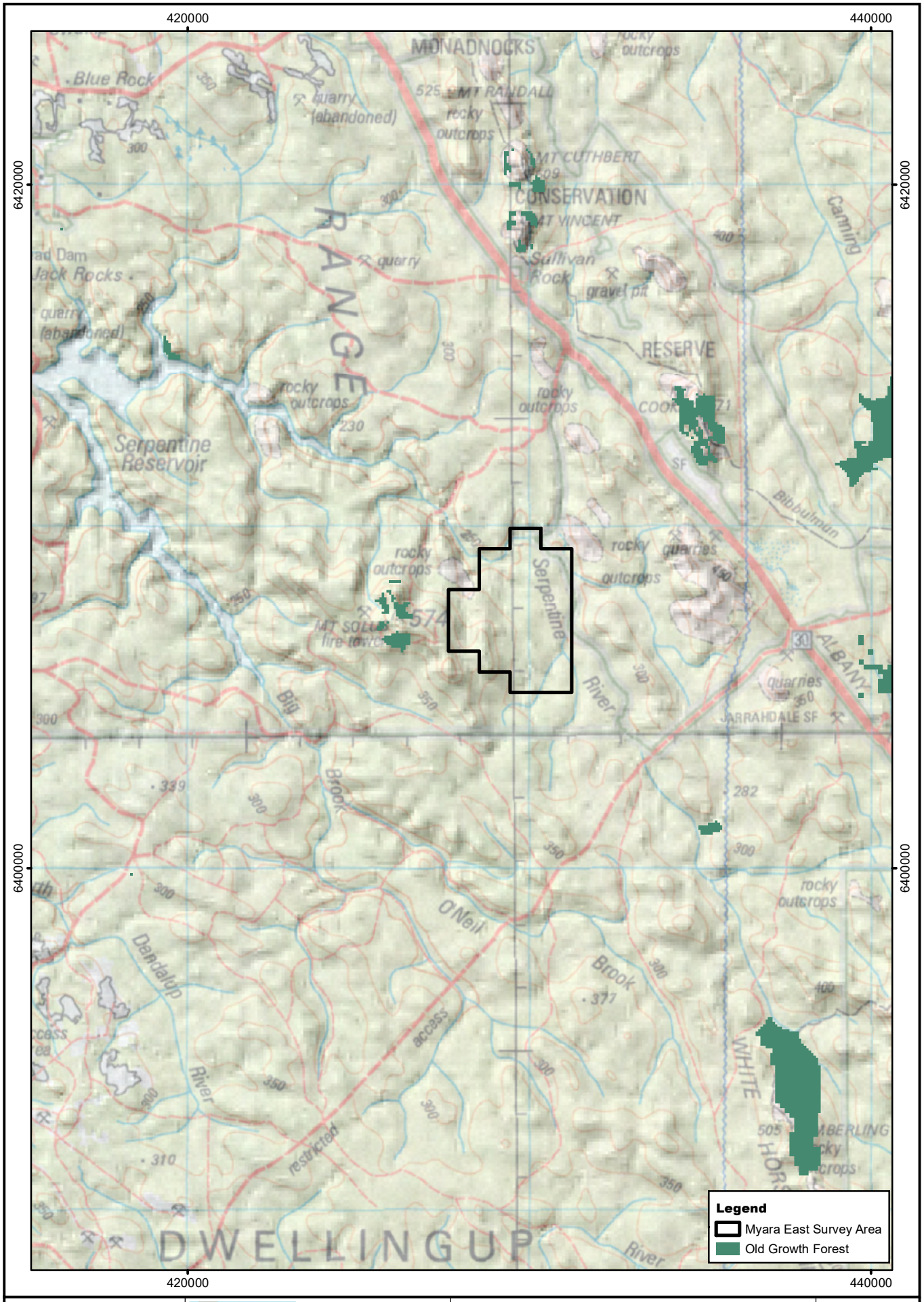
Myara East Survey Area

GDE based on Veg Complexes

Figure: **8**



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Scale: 1:150,000
MGA94 (Zone 50)

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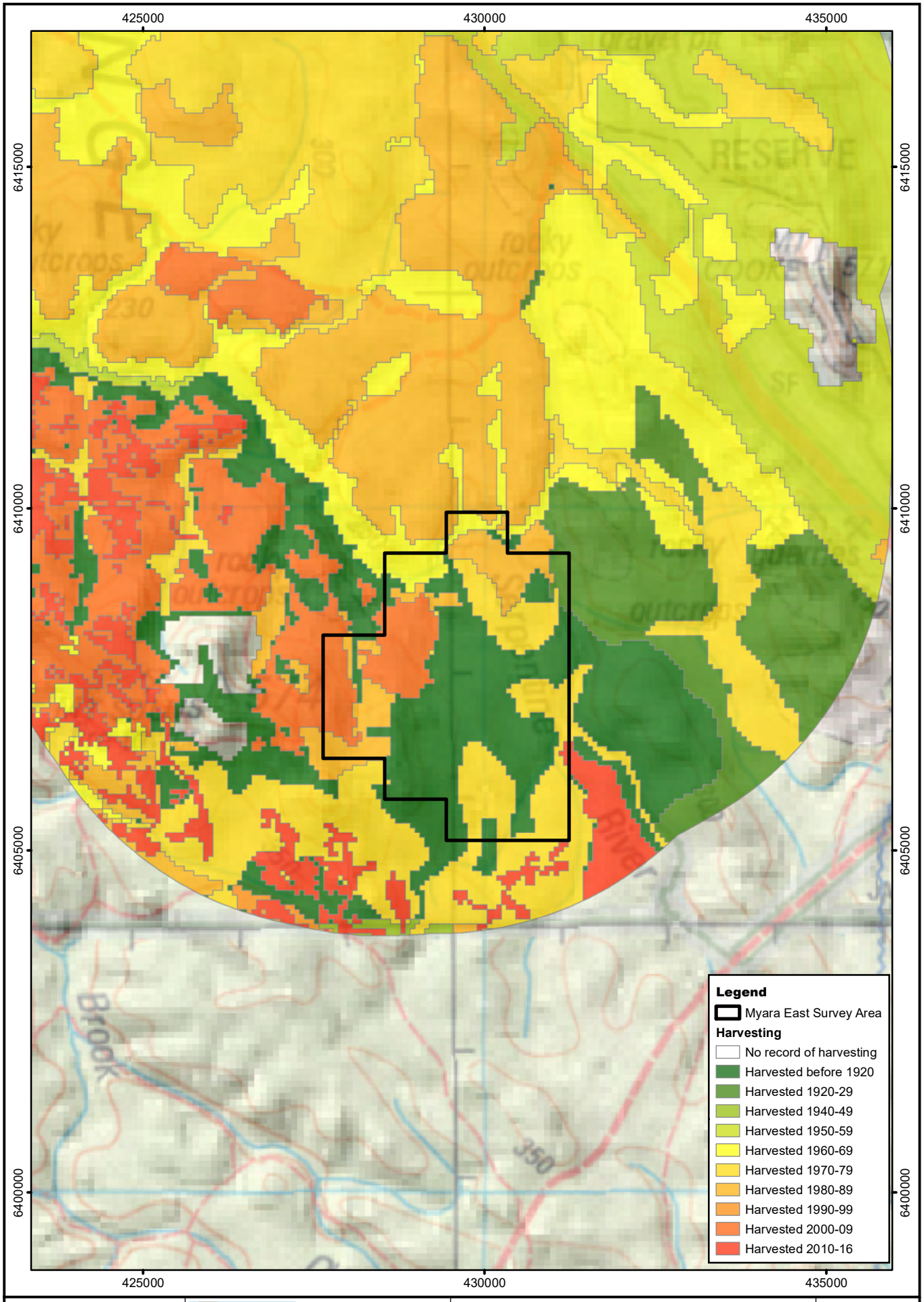
Myara East Survey Area
Old Growth areas (DBCA)

Figure: **9**



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

CAD Ref: a1992_MyEst_F02_13

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Myara East Survey Area
Harvest History (DBCA)

Figure:
10

4.10. Previous Surveys

Over the past forty years, Mattiske Consulting has previously mapped the vegetation associated with the Jarrahdale, Huntly (including previous Myara areas) (E.M. Mattiske and Associates 1988, 1992, 1993 and Mattiske Consulting Pty Ltd 2009, 2011, 2012, 2019, 2020). The most recent local and specific flora and vegetation studies relevant to this current survey occurred westward and north-westward from the Myara East survey area.

4.11. Potential Threatened and Priority Ecological Communities

There are two priority ecological communities (PECs), as listed at State level by DBCA (2022a) that occur in the wider Myara areas (Figure 6); only one of these is a botanical PEC.

The priority ecological communities that occur in the wider Myara survey areas are:

- Granite communities of the northern Jarrah forest (P3)
    - Jarrahdale area – Monadnocks, Blue Rock; insufficient information to distinguish discrete community type/s (DBCA 2020a).
- Litter Dependant Invertebrate Community of the northern Jarrah Forest (P2)
    - Chandler Block, Northern Jarrah Forest; insufficient evidence that this is a discrete community type (DBCA 2020a).

No threatened ecological communities (TECs) listed at Commonwealth level pursuant to sections 181 and 182 of the *EPBC Act* and listed by the DAWE (2022e) or at State level pursuant to Part 2 of the *BC Act* and as listed by DBCA (2018b) occur within the Myara East survey area. The closest TECs occur either on the Swan Coastal Plain or in the Western Australian Wheatbelt which do not occur in the Myara East survey area.

4.12. Wetlands of International Importance (Ramsar)

No wetlands of international importance listed at Commonwealth level pursuant to sections 181 and 182 of the *EPBC Act* and listed by the DAWE (2022e) or at State level pursuant to Part 2 of the *BC Act* and as listed by DBCA (2018b) occur within the Myara East survey area. The closest wetlands of international importance occur on the Swan Coastal Plain.

5. FIELD STUDIES FINDINGS

The following text summarizes the key findings from recent studies in 2021 and 2022 within the Myara survey area; which includes recording sites for vegetation mapping and opportunistic and targeted assessments.

5.1 Survey Effort

The survey efforts has been undertaken over a decade from multiple studies within the Myara and Huntly areas. The major effort in 2021 and 2022 which when combined with the depth of previous studies in adjacent areas for both Alcoa and also other clients leads to the conclusion that the work exceeds the current EPA Guidance Statement (2016a and 2016b) expectations for flora and vegetation studies.

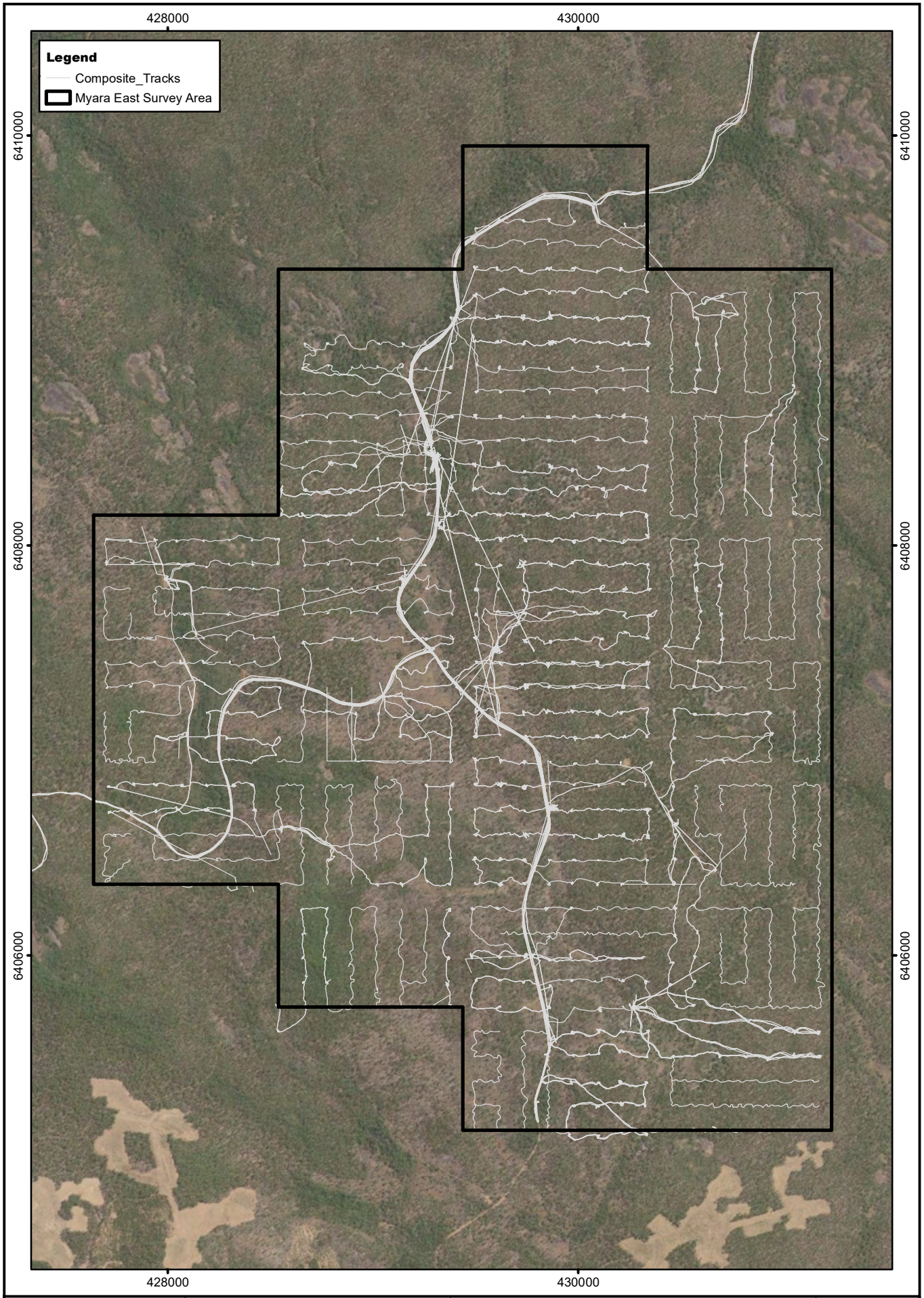
The survey effort to date has included (see Figure XX):

- More than 108 kilometres of foot transects which includes the mapping efforts and targeted searches;
- 960 recording sites in 2021/2022 on a grid system which varied slightly from 120m x 120m with some sites closer than this average and some slightly wider. This pattern of recording is consistent with previous ecological studies in the northern Jarrah forest for both Alcoa and other clients in nearby areas;
- targeted searches of additional extreme sites that are variable within the broader Yarragil and Swamp vegetation complexes as well as the variable communities on the granite and outcropping areas in the Myara East survey area. The coverage of the flora on the granite and swamp areas relied on the recording sites and targeted searching;
- detailed and consistent data collection on position in the landscape, soils, flora, vegetation and vegetation condition.
- consistent interpretation in line with previous site-vegetation studies where there is a greater reliance on key indicator species and a series of site parameters rather than the accepted clustering and groupings. Such an approach differs from the EPA guidance statement, but if the latter was followed the dominance of some tree and understorey species in the analyses would lead to a less comprehensive delineation of biodiversity values and also be inconsistent with the approach adopted on all other Alcoa leases where detailed flora and vegetation studies have been undertaken in the past by the Mattiske team and site personnel. In summary, the survey effort easily exceeds the expectations of the EPA Guidance Statement (2016a, 2016b).

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

Table 4: Potential flora and vegetation survey limitations for the Myara 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 was sampled on a close grid pattern within the survey area. In addition to the regular sampling sites, searches were undertaken to assess the likelihood of threatened and priority flora species.
Proportion of flora collected and identified (based on sampling, timing and intensity)	**Not a constraint:** The survey areas near Jarrahdale, Huntly and Myara have been sampled over multiple years, with the more recent work on the detailed records on the grid system and targeted searches between sites. The recent survey effort in the majority of the areas was undertaken in spring, summer and winter months 2021/2022 (October 2021 to May 2022). 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.
Mapping reliability	**Not a constraint:** The vegetation was mainly assessed on a 120m x 120m grid pattern within the survey area. Over 120 kilometres were surveyed within the survey area. This together with 960 recording sites and the targeted and opportunistic survey sites (particularly near the granites and swamp areas) enabled intensive coverage of the values on the Myara East survey area and therefore the associated mapping of key flora values and the site-vegetation types with a high level of confidence.
Timing, weather, season, cycle	**Not a constraint:** The EPA (2016a) recommends that flora and vegetation surveys in the South – West Botanical Province be conducted in Spring (September-November). The intensive work undertaken in sections of Myara has enabled coverage of different seasons. The detailed survey work commenced in October 2021 and continued to May 2022.
Disturbances (fire flood, accidental human intervention, *etc.*)	**Not a constraint:** With the exception of previous logging activities and occasional old forestry tracks, the vegetation of the survey area is largely undisturbed. In view of the 40 years of experience by Dr Mattiske in northern Jarrah forest vegetation mapping the latter is not considered to lead to any constraints.
Access problems (*i.e.* ability to access survey area)	**Not a constraint:** Vehicle access through the Myara survey area was only restricted in small sections.
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 a range of other clients, and thus were familiar with the local flora and vegetation values. Dr Mattiske has more than 40 years of ecological experience in flora and vegetation studies in the southwest forests at a detailed floristic level, as well as detailed and regional vegetation assessment level.



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MGA94 (Zone 50)

CAD Ref: a1992_MyEst_F02_07

Date: July 2022 | Rev: A | A4

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Myara East Survey Area
Survey Tracks

Figure:
11

5.2 Flora

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

A total of 288 taxa from 47 families and 119 genera was recorded in the Myara East survey area and as such partly reflects the smaller survey area.

The range of flora collected on the Myara East survey area is summarized in Table 5 and Appendix B. As the survey efforts were undertaken over multiple years and also seasons the coverage of the flora was considered to exceed the EPA (2016a and 2016b) guidance statements expectations. The recordings on the grids was undertaken over a 7 month period the coverage of the flora in more diverse and spatially more complex areas such as the swamps, broad valley systems and the outcrops was considered to be comprehensive.

Table 5: Summary of Flora Species on the Myara East survey area (see Appendix B)

Source	Families	Genera	Native Taxa	Introduced Taxa
Myara East survey area	47	119	280	8
Myara/Huntly Regional Mapping	73	246	731	38
Nature Map Potential Flora Species (Appendix B)	94	351	1168	149
Nature Map and Additional Potential and recorded Species (see Appendix B)	108	411	1454	192

Of interest is the shift in landforms and soils from west to east across the East survey area and the latter is reflected in the change in the dominance of flora species that tolerate the broader valley systems, swamps and the outcrop areas. The summary of results from the plots and the recording sites as summarized by the site-vegetation types reflects this shift from species in the lateritic slopes and ridges and the broader valleys and outcrops (see Appendix xx).

5.3 Introduced Flora Species

Of the 288 species, 8 were introduced or planted species. Of interest is the occurrence of **Selago corymbosa* which appears to be a garden escape. The other introduced species **Senecio diaschides,* *Asteraceae sp., **Disa bracteata, *Aira caryophyllea* and **Pentameris airoides* all occur more widely in the Jarrah forest and are not listed as WONS weeds at the National scale or as Declared pests at the State level. Two of the eight species appear to have been planted (*Eucalyptus resinifera* and *Melaleuca armillaris*).

5.4 Threatened and Priority Flora

No Threatened flora species, pursuant to section 179 of the *EPBC Act* and as listed by DAWE (2022a) or pursuant to Part 2, Division 1 and Subdivision 2 of the *BC Act* and as listed by DBCA (2018a) were recorded during recent assessments of the Myara East survey area.

Two Priority flora species as listed by DBCA (2018c) have been recorded in the Myara East survey area (Appendix B), Table 6 and Figure 12b.

Table 6: Summary of Priority Flora recorded in Myara East survey area

SPECIES	Federal Conservation Status	State Conservation Status	Site-vegetation Types
Lasiopetalum cardiophyllum	-	P4	PS, R
Senecio leucoglossus	-	P4	S

Lasiopetalum cardiophyllum (P4) is known from 34 records at the State Herbarium (DBCA 2007-) and is generally on the eastern lateritic gravelly soils to sandy-clay slopes on flats and hillslopes in the northern Jarrah forest with extensions in occurrence into the Wheatbelt. This species has been recorded regularly in the eastern areas of the northern Jarrah forest by the Mattiske teams over some four decades.

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

5.5 Site-vegetation Types

A total of 19 site-vegetation types were defined and mapped in the Myara East survey area, Table 7 and Figures 12a and 12b. The site-vegetation types were subdivided into four main groupings associated with site conditions which reflected landforms, soils and soil moisture levels, Table 7. The site-vegetation types on the extreme sites such as outcrops and broad valley systems and swamps differ markedly from the forest and woodland areas on the slopes and ridges. The delineation of the site-vegetation types was based on the earlier work of Havel (1975a and 1975b) and as such rely on key site and species indicators. Whilst Mattiske has refined these initial site-vegetation types there is still a reliance on the original work of Havel (1975a and 1975b). The initial code is the dominant site-vegetation type code and the second code (where added) reflects some local influence of secondary key stone species. These site-vegetation types were developed in consultation with Dr David Goodall (formerly CSIRO at the time). In the 1970's Dr Havel and Dr Goodall undertook extensive analyses to delineate and differentiate the key species and site parameters that assist in the division of the continuum of the dominant trees of *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri). This approach has been used for some 45 years and as such to deviate from such an approach and rely on other approaches would negate the effort to date and the ability to align the findings with other areas in the northern Jarrah forest. So whilst such an approach might be perceived by assessors to deviate from the EPA guidance statements, to not adopt the site-vegetation approach would diminish the delineation of the biodiversity values in the Myara East survey area. In addition the ranking of species and condition of species in the field has increased the intensity and coverage of the sites within the Myara East survey area.

The dominant site-vegetation types were S and PS (50.18%) on the slopes ad ridges and D and PW on the moister slopes (22.8%). The more extreme sites associated with swamps (types A, C, AC and CW) or granite outcrops (types G and R) covered less than 8.6% and 6.02% of the area respectively, Table 7.

The series of site-vegetation types associated with the broader valley systems which dominate the Yarragil 1 vegetation complex as defined by Mattiske and Havel (1998) provide a spatial diversity that supports a

range of species. The site-vegetation types associated with these broader valleys (A, AC, D, DA, DG, E, PW and SW) and lower slopes have the potential to be groundwater dependent ecosystems.

Key indicator plant species that are generally accepted as indicators of moister soils and, hence, potential groundwater dependent ecosystems include – *Banksia littoralis, Hakea varia, Thomasia paniculata, Astartea scoparia, Babingtonia camphorosmae, Hypocalymma angustifolium, Hypocalymma cordifolium, Melaleuca preissiana, Melaleuca rhaphiophylla, Melaleuca lateritia, Melaleuca viminea,* and *Taxandria linearifolia.*

The site-vegetation types of PW and SW reflect the moister soils that may influence the spread and intensification of *Phytophthora cinnamomi.* The site-vegetation types supporting stands of *Kingia australis* (E) are locally restricted in extent and this pattern of occurrence generally occurs in the northern Jarrah forest on the lower slopes.

Whilst some of these values have been highlighted, the only current Priority Ecological Community is associated with the G and R site-vegetation types. Whilst not all of these areas have been high-lighted by DBCA (2022a), see Figure 7. There is a lack of clarity on the values that determine the presence of the Priority Ecological Community other than the association with the outcrops.

5.6. Vegetation Condition

The majority of the vegetation was ranked as excellent despite historical harvesting activities and some established tracks in the area, Figure 13. Some areas have been influence by the Jarrah Dieback disease and although the composition of the understorey has been modified as a result of the *Phytophthora cinnanomi* infections these areas still provide a range of native species towards the forest values.

5.7. Threatened and Priority Ecological Communities

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

One of the priority ecological communities (PECs), as listed at State level by DBCA (2020a) occurs near the Myara East survey area, namely:

- Granite communities of the northern Jarrah forest (P3)
    - Jarrahdale area – Monadnocks, Blue Rock; insufficient information to distinguish discrete community type/s (DBCA 2020a).

There is a potential that the site-vegetation types associated with granite outcrops (site-vegetation types G and R), and the Cooke vegetation complex as defined by Mattiske and Havel (1998) will have affinities with the PEC.

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

Table 7: Summary of Site-vegetation Types (SVT) on the Myara East survey area

SVT Code	Description	Area_ Ha	% Total
Swamps (A, AC) and Creeklines (C, CW)			
A	Tall shrubland of *Melaleuca lateritia, Hakea varia, Melaleuca viminea* and *Melaleuca incana* subsp. *incana* on clay-loams in seasonally wet valley floors.	40.29	3.11
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.	48.02	3.71
C	Woodland to Open Forest of *Eucalyptus patens – Corymbia calophylla - Banksia littoralis* and *Banksia seminuda* with dense *Taxandria linearifolia* and *Astartea scoparia* in understorey on creek-lines and water-courses.	1.33	0.10
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.	22.52	1.74
Lower Slopes (D, DA, DG, E, W) and Moister Slopes (PW and SW)			
D	Open Forest of *Eucalyptus marginata -Corymbia calophylla – Hakea prostrata* on lower slopes with mixed low understorey species, including *Babingtonia camphorosmae* and *Acacia extensa* on clay loams to gravelly clay-loams.	158.01	12.20
DA	Open Forest of *Eucalyptus marginata -Corymbia calophylla – Hakea prostrata* on lower slopes with patches of *Melaleuca preissiana, Banksia littoralis* and *Hakea varia* over mixed low understorey species, including *Babingtonia camphorosmae* and *Acacia extensa* on clay loams to gravelly clay-loams. Local variant also includes *Xylomelum occidetale (*Woody Pear).	0.50	0.04
DG	Open forest of *Corymbia calophylla* and *Eucalyptus marginata* over *Hakea lissocarpha, Macrozamia riedlei, Pericalymma ellipticum, Grevillea bipinnatifida, Allocasuarina humilis, Acacia alata, Babingtonia camphorosmae, Hypocalymma angustifolium* and *Phyllanthus calycinus* on clay-loams on lower slopes with localized patches of outcropping.	5.40	0.42
E	Open woodland of *Eucalyptus marginata* and *Corymbia calophylla* over *Mesomelaena tetragona, Kingia australis, Leptospermum erubescens* and *Babingtonia camphorosmae* on sandy to sandy-loam soils on slopes.	12.71	0.98
W	Open Forest of *Eucalyptus megacarpa - Eucalyptus patens – Corymbia calophylla* on lower slopes with mixed low understorey species, including *Acacia extensa* and *Hypocalymma angustifolium* on seasonally moister sandy-loam gravelly soils.	3.54	0.27
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.	137.36	10.60
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.	43.20	3.33
Outcrop Areas (G, R)			
G	Mosaic of Open Woodland of *Eucalyptus margnata – Corymbia calophylla* on the fringes of outcrops ranging to open heath communities of Proteaceae-Myrtaceae species and lithic complexes on the outcrop areas.	26.97	2.08
R	Open Woodland of *Eucalyptus marginata - Corymbia calophylla* on fringes of granite outcrops or shallow soils over mixed understorey species reflecting shallow soils over granite.	51.08	3.94
Slopes and Upper Ridges (P, PS, S, SP, ST, TS)			
P	Open Forest of *Allocasuarina fraseriana - Eucalyptus marginata - Corymbia calophylla - Banksia grandis* with scattered understorey, including *Adenanthos barbiger, Styphelia nitens, Grevillea wilsonii, Leucopogon capitellatus* on sandy gravels.	78.73	6.08
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.	189.20	14.61
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.	460.82	35.57
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.	7.27	0.56
ST	Open Forest of *Eucalyptus marginata - Corymbia calophylla* with scattered understorey, including *Leucopogon capitellatus, Leucopogon verticillatus, Pteridium esculentum, Lasiopetalum floribundum* and *Styphelia tenuiflora* on sandy-gravelly soils.	5.55	0.43
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.	2.92	0.23

Code	Description of Site-Vegetation Types
A	Tall shrubland of mixed *Melaleuca* spp., *Taxandria linearifolia, Hypocalymma angustifolium, Pericalymma ellipticum* with emergent *Melaleuca preissiana* on clay-loams in seasonally wet valley floors.
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.
D	Open Forest of *Eucalyptus marginata -Corymbia calophylla – Eucalyptus patens - Alllocasuarina fraseriana - Hakea prostrata* with *Xylomelum occidentale* 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.
DA	Open Forest of *Eucalyptus marginata -Corymbia calophylla – Eucalyptus patens - Alllocasuarina fraseriana - Hakea prostrata* and *Xylomelum occidentale* 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.
DG	Open forest of *Corymbia calophylla* and *Eucalyptus marginata* over *Hakea lissocarpha, Macrozamia riedlei, Pericalymma ellipticum, Grevillea bipinnatifida, Acacia alata, Babingtonia camphorosmae, Hypocalymma angustifolium* and *Phyllanthus calycinus* on clay-loams on lower slopes with localized patches of outcropping.
E	Open woodland of *Eucalyptus marginata* and *Corymbia calophylla* over *Mesomelaena tetragona, Kingia australis, Leptospermum erubescens* and *Babingtonia camphorosmae* on sandy to sandy-loam soils on 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.
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.
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.
P	Open Forest of *Allocasuarina fraseriana - Eucalyptus marginata - Corymbia calophylla - Banksia grandis* with scattered understorey, including *Adenanthos barbiger, Styphelia nitens, Grevillea wilsonii, Leucopogon capitellatus* on sandy gravels.
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.
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.
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.
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.
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.
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.
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.
R	Open Woodland of *Eucalyptus marginata - Corymbia calophylla* on fringes of granite outcrops or shallow soils over mixed understorey species reflecting shallow soils over granite.
G/G1	Mosaic of Open Woodland of *Eucalyptus marginata – Corymbia calophylla* on the fringes of outcrops ranging to open heath communities of Proteaceae-Myrtaceae species and lithic complexes on the outcrop areas.

MCPL Flora

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4

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ALCOA

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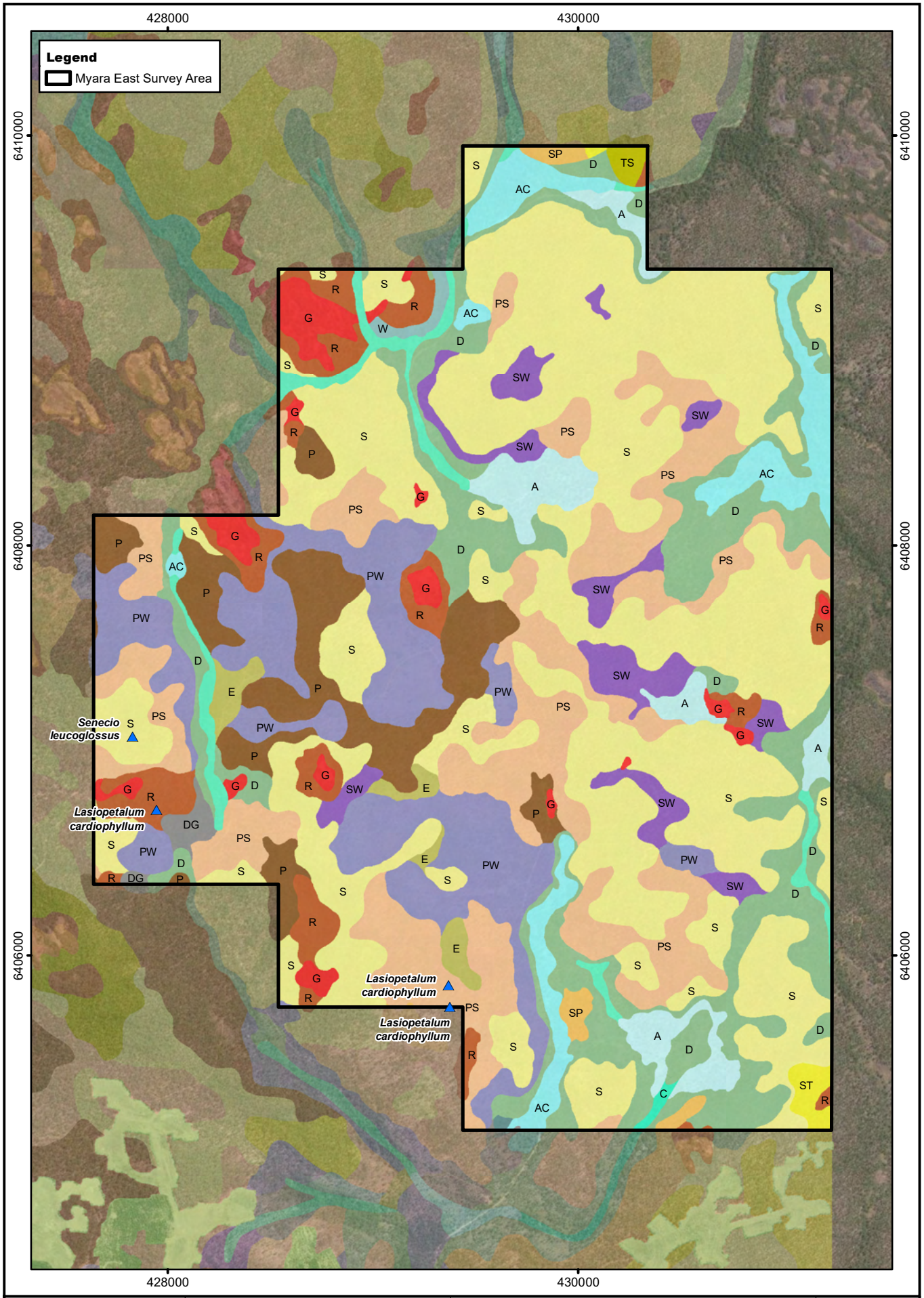
Myara East Survey Area
Vegetation Legend

Figure: **12a**



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Scale: 1:25,000
MGA94 (Zone 50)

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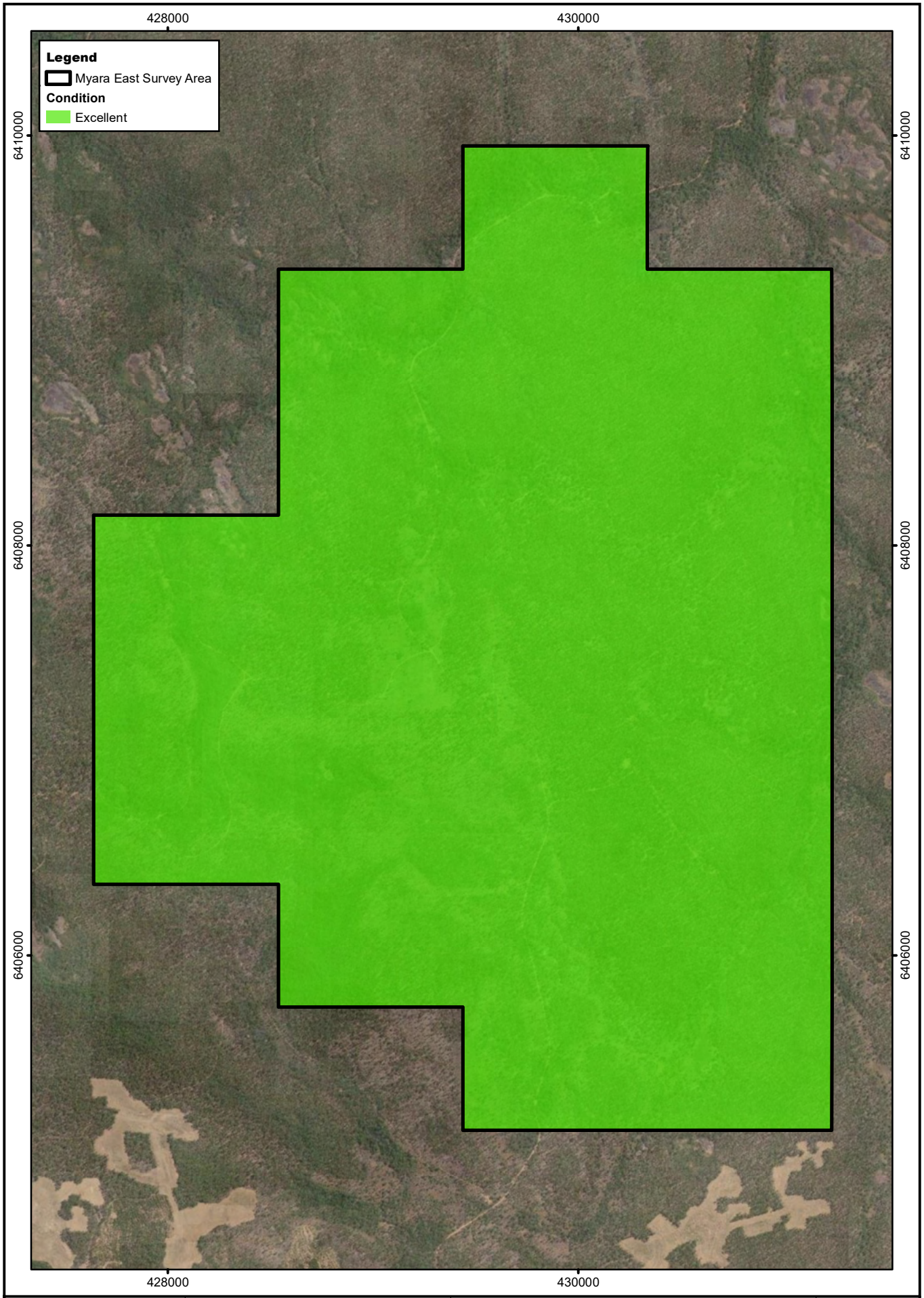
Myara East Survey Area
Vegetation

Figure:
12b



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Scale: 1:25,000
MGA94 (Zone 50)

CAD Ref: a1992_MyEst_F02_10

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Myara East Survey Area
Vegetation Condition

Figure:
13

5.8. Old Growth Forests

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

On the basis of the number of potential habitat trees there are some areas of Myara East that have some potential to reflect lower logging rates (Figures 14 and 15).

In reviewing the data as collected within the Myara East survey area it is apparent that the swamp areas (A and AC) supported few larger trees and the site-vegetation types (TS, ST, SP, G and R) supported proportionally higher number of larger potential habitat trees (Diameter at Breast Height (DBH) > 50cm).

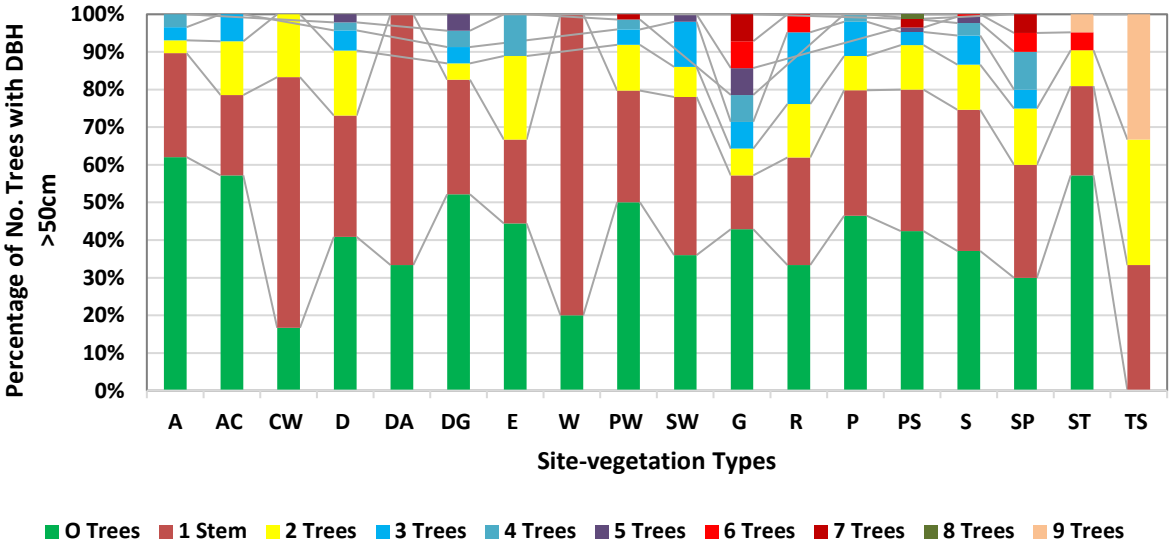
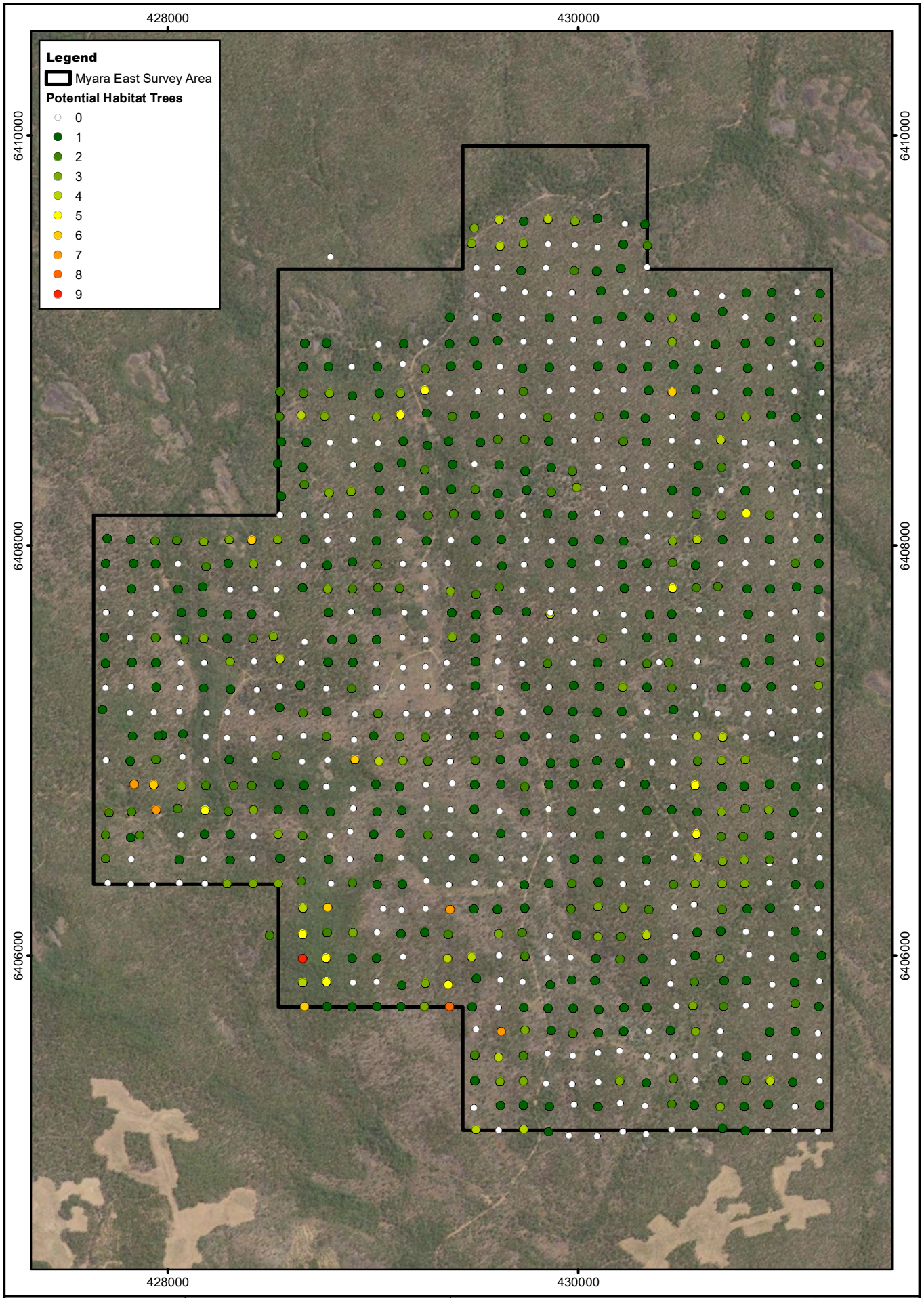


Figure 14: Summary of Number of Potential Habitat Trees (>50cm DBH) in the respective Site-vegetation Types on Myara East survey area



N

0 200 400 m

Scale: 1:25,000
MGA94 (Zone 50)

CAD Ref: a1992_MyEst_F02_14

Date: July 2022 | Rev: A | A4

Mattiske Consulting Pty Ltd
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Myara East Survey Area
Potential Habitat Trees

Figure:

15

6. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

6.1. Flora

The survey efforts were undertaken over 7 months, largely in late spring (due to late seasonal rains) through to May 2022. The seasonal work in the Myara East area and nearby survey areas in recent years was considered to exceed the EPA (2016a and 2016b) guidance statements expectations.

A total of 288 taxa was recorded in the Myara East survey area. This is within the range that would be expected in the smaller area of Myara East. Of the 288 species, 8 were introduced or planted species. Of interest is the occurrence of **Selago corymbosa* which appears to be a garden escape. The other introduced species **Senecio diaschides,* *Asteraceae sp., **Disa bracteata, *Aira caryophyllea* and **Pentameris airoides* all occur more widely in the Jarrah forest and are not listed as WONS weeds at the National scale or as Declared pests at the State level. Two of the eight species appear to have been planted (*Eucalyptus resinifera* and *Melaleuca armillaris*).

No Threatened flora species, pursuant to section 179 of the *EPBC Act* and as listed by DAWE (2022a) or pursuant to Part 2, Division 1 and Subdivision 2 of the *BC Act* and as listed by DBCA (2018a) were recorded during recent assessments of the Myara East survey area.

Two Priority flora species as listed by DBCA (2018c) have been recorded in the Myara East survey area - *Lasiopetalum cardiophyllum* (P4) and *Senecio leucoglossus* (P4).

Of interest is the shift in landforms and soils from west to east across the Myara East survey area and the latter is reflected in the change in the dominance of flora species that tolerate the broader valley systems, swamps and the outcrop areas from the slopes and ridges of the Dwellingup lateritic landforms.

6.2. Vegetation

The vegetation in and around the Myara Easy survey area has been described by several authors with slightly different perspectives, including botanical subdistricts, soil-landscape zones, land systems and vegetation communities. In general, the vegetation can be summarised as being dry sclerophyllous forest typically comprising a dominant *Eucalyptus marginata* and *Corymbia calophylla* over *Allocasuarina fraseriana*, *Banksia grandis*, *Xanthorrhoea preissii*, and *Macrozamia riedlei*. The topography throughout the survey area consists of granite ridges, swamps and slopes; a variety of habitats contributing to the high level of species diversity.

A total of 19 site-vegetation types were defined and mapped for the Myara East survey area. The site-vegetation types were subdivided into four main groupings associated with site conditions which reflected landforms, soils and soil moisture levels. The site-vegetation types on the extreme sites such as outcrops and broad valley systems and swamps differ markedly from the forest and woodland areas on the slopes and ridges. The delineation of the site-vegetation types was based on the earlier work of Havel (1975a and 1975b) and as such rely on key site and species indicators. Whilst Mattiske has refined these initial site-vegetation types there is still a reliance on the original work of Havel (1975a and 1975b). The initial code is the dominant site-vegetation type code and the second code (where added) reflects some local influence of secondary key stone species. These site-vegetation types were developed in consultation with Dr David Goodall (formerly CSIRO at the time). In the 1970's Dr Havel and Dr Goodall undertook extensive analyses to delineate and differentiate the key species and site parameters that assist in the division of the continuum of the dominant trees of *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri). This approach has been used for some 45 years and as such to deviate from such an approach and rely on other approaches would negate the effort to date and the ability to align the findings with other areas in the northern Jarrah forest. So whilst such an approach might be perceived by assessors to deviate from the EPA guidance statements, to not adopt the site-vegetation approach would diminish the delineation of the biodiversity values in the Myara East survey area. In addition the ranking of species and condition of

species in the field has increased the intensity and coverage of the sites within the Myara East survey area.

The dominant site-vegetation types were S and PS (50.18%) on the slopes ad ridges and D and PW on the moister slopes (22.8%). The more extreme sites associated with swamps (types A, C, AC and CW) or granite outcrops (types G and R) covered less than 8.6% and 6.02% of the area respectively, Table xx.

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

Key indicator plant species that are generally accepted as indicators of moister soils and, hence, potential groundwater dependent ecosystems include – *Banksia littoralis, Hakea varia, Thomasia paniculata, Astartea scoparia, Babingtonia camphorosmae, Hypocalymma angustifolium, Hypocalymma cordifolium, Melaleuca preissiana, Melaleuca rhaphiophylla, Melaleuca lateritia, Melaleuca viminea,* and *Taxandria linearifolia.*

The site-vegetation types of PW and SW reflect the moister soils that may influence the spread and intensification of *Phytophthora cinnamomi.* The site-vegetation types supporting stands of *Kingia australis* (E) are locally restricted in extent and this pattern of occurrence generally occurs in the northern Jarrah forest on the lower slopes.

Whilst some of these values have been highlighted, the only current Priority Ecological Community is associated with the G and R site-vegetation types. Whilst not all of these areas have been high-lighted by DBCA (2022a). There is a lack of clarity on the values that determine the presence of the Priority Ecological Community other than the association with the outcrops.

The majority of the vegetation was ranked as excellent despite historical harvesting activities in the westerns section and local influences of tracks. The biodiversity values have persisted in many areas instances. Some areas have been influence by the Jarrah Dieback disease and although the composition of the understorey has been modified as a result of the *Phytophthora cinnanomi* infections these areas still provide a range of native species towards the forest values.

6.3. Potential Groundwater Dependent Ecosystems

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

6.4. Threatened and Priority Ecological Communities

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

One of the priority ecological communities (PECs), as listed at State level by DBCA (2020a) occurs within the Myara East survey area, namely the Granite communities of the northern Jarrah forest (P3). There is a potential that the site-vegetation types associated with granite outcrops (site-vegetation types G and R), and the Cooke vegetation complex as defined by Mattiske and Havel (1998) will have affinities with the PEC.

The Myara East survey area occurs within the Regional Forest Agreement (RFA) area of the southwest forests DAWE (2020b) and as such was considered during the RFA process.

6.5. Old Growth Forests

Based on data as supplied by DBCA (2020) there are a number of patches of old growth forests occurring in the area surrounding the Myara East survey area; however based on data supplied by the Department of Biodiversity, Conservation and Attractions no areas have been highlighted within the Myara East survey area.

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

In reviewing the data as collected within the Myara East survey area it is apparent that the swamp areas (A and AC) supported few larger trees and the site-vegetation types (TS, ST, SP, G and R) supported proportionally higher number of larger potential habitat trees (Diameter at Breast Height (DBH) > 50cm).

7. ACKNOWLEDGEMENTS

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

8. PERSONNEL

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

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D. Rubick	Botanist	Field Studies, Data Collation	FB62000328-2
A. Rowe	Botanist	Field Studies, Data Collation	FB62000329-2
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J. C. Mooney	Botanist	Field Studies, Data Collation	FB62000416
J. Wescombe	Botanist	Data collation, reporting	N/A
R. Jones	Botanist	Data collation and Assisting with Reporting	N/A
T. Gregory	Technical Support	Data Collation and Assisting with Reporting	N/A

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APPENDIX A1: THREATENED AND PRIORITY FLORA DEFINITIONS

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

Table A1.1 Federal definition of threatened flora species

Note: Adapted from section 179 of the EPBC Act.

CODE	CATEGORY	DEFINITION
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] (2018a) 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 (DBCA 2019). 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 (2019).

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 2019). 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 (2019).

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 2018b). 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 Department of Environment and Conservation (2013).

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 (2020a) in the *Priority Ecological Communities for Western Australia – Version 29 (05 May 2020)*. 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 Department of Environment and Conservation (2013).

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 2020).

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: VEGETATION CONDITION SCALE (adapted from Keighery 1994 and Trudgen 1988 and as summarized in EPA Guidance Statement 2016b and modified to adjust to "forest" areas)

Vegetation Condition	EPA Definition (2016b) - South West and Interzone Botanical Provinces	Comments reflecting condition ratings for "Forest" areas (including diversity of structural and floristic composition areas)	Clearing Agriculture Residential	Post-Mining & Rehabilitation	Tracks & Roads	Logging Harvest Records, Stumps	Dieback	Introduced Flora Species
Pristine	Pristine or nearly so, no obvious signs of disturbances caused by human activities since European settlement.	Very restricted areas as most areas been subject to some disturbance.	None	None	None	No Logging (old growth forest)	None obvious, limited / no vulnerable species	Limited / no presence
Excellent	Vegetation Structure intact, disturbance affecting individual species and weeds are non-aggressive. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional tracks.	Very little evidence of logging in past. Occasional tracks, past burning, no obvious dieback, presence of short-lived non-aggressive weed.	None	None	Occasional tracks	Predominantly mature forest (last harvest > 70 years ago)	None obvious, limited / no vulnerable species	Non aggressive weeds
Very Good	Vegetation Structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.	Some modification to structural components through past logging activities, repeated fires. Grazing only by native animals in forests. No obvious dieback, presence of short-lived non-aggressive weed.	None	None	Occasional tracks	Immature forest (last harvest > 20, < 70 years ago)	Limited dieback infestation on localised areas, limited vulnerable species	Non-aggressive weeds
Good	Vegetation Structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.	Some modification to structural and floristic components through past mining and logging activities. Occurrence of repeated fires that have impacted vegetation. Grazing mainly by native animals in forests and occasional feral animal (e.g. pigs).	Localised partial clearing near past logging activities and tracks and previous facilities	Rehabilitation areas with structural and/or floristic components developing and persisting (post 2000, Grant and Koch 2007)	Occasional tracks and informal roads	Juvenile forest (last harvest < 20 years ago)	Extensive dieback infestation, prevalent vulnerable species, some structural impact	Aggressive weeds and non-aggressive weeds reflecting disturbance
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.	Basic vegetation structure severely impacted by disturbance. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.	Partial clearing near past logging activities and tracks and previous facilities	Rehabilitation areas with lower species diversity (pre 2000, Grant and Koch 2007) and/or early phases of regrowth and establishment of tree species with potential for shift to Good	Extensive tracks, informal roads	Logged land is expected to recover to Good (juvenile forest)	Extensive dieback infestation, dominant vulnerable species, severe structure impact	High density of aggressive weeds or presence of introduced crop species or plantation species
Completely Degraded	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 crops species with isolated native trees and shrubs.	Mostly cleared areas supporting only occasional native trees or planted trees, mainly small agricultural holdings or residential and highly modified areas.	Cleared agricultural and residential areas.	Recently cleared mine areas, rehabilitation not completed.	Extensive tracks and roads	Logged land is expected to recover to Good if rehabilitation undertaken	Extensive dieback infestation, dominant vulnerable species, structure no longer intact.	Plantations, understorey is predominantly introduced species.

APPENDIX B: SUMMARY OF POTENTIAL AND RECORDED PLANT SPECIES RECORDED IN MYARA AND O'NEILL, 2006 TO 2022

Note : * denotes alien species; PL denotes planted species; PL* denotes both planted/alien; and # referring to part native and part naturalised. T, P1 to P4 reflect Threatened and Priority species (DBCA 2019). SCC = State Conservation Code; FCC= Federal Conservation Code; CE = Critically Endangered; E = Endangered; V= Vulnerable. EPBC[A] (DAWE, 2022), NatureMap[B] (DBCA, 2022), NatureMap[C] (DBCA, 2020), MCPL[D] (MCPL, 2020), MCPL[E] (MCPL, 2021), O'Neill[F] (MCPL, 2009), MCPL [G] (2022)

Family	Species	Data source														
		SCC	FCC	EPBC[A]	NatureMap[B] 10km	NatureMap[C] 20km	MCPL[D] 2006	MCPL[D] 2011	MCPL[D] 2019	MCPL[E] 2008	MCPL[E] 2009	MCPL[E] 2010	MCPL[E] 2012	O'Neill[F] 2009	Mapping Myara North [E]2019/20	Plots Myara North[E] 2019/20	MCPL[G] 2022
Aizoaceae	* *Aizoon pubescens*					x											
Amaranthaceae	*Ptilotus drummondii*												x		x		
	Ptilotus drummondii var. *drummondii*					x											x
	Ptilotus esquamatus					x											
	Ptilotus manglesii				x	x	x	x		x	x		x	x	x	x	x
	Ptilotus polystachyus					x											
	Ptilotus sp.						x						x	x			
Anarthriaceae	*Anarthria humilis*					x											
	Lyginia barbata						x	x		x	x	x	x	x	x		x
	Lyginia imberbis														x		
	Lyginia sp.							x									
	Anarthriaceae sp.																x
Apiaceae	*Actinotus glomeratus*				x	x											
	Actinotus leucocephalus					x											
	Apium prostratum							x			x		x				
	Centella asiatica														x		
	Daucus glochidiatus					x	x			x					x		
	Eryngium pinnatifidum					x											
	Eryngium pinnatifidum subsp. *pinnatifidum*					x											
	Homalosciadium homalocarpum				x	x	x										

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Family	Species	Data source														
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Apiaceae (cont.)	*Pentapeltis peltigera*				x	x	x	x	x	x	x	x	x	x	x	x	x
	Platysace compressa					x		x	x	x	x		x	x	x	x	x
	Platysace filiformis				x	x		x	x	x	x	x	x	x			x
	Platysace juncea					x											
	Platysace tenuissima							x	x	x	x	x	x	x	x		x
	Platysace sp.									x							
	Schoenolaena juncea					x											
	Xanthosia atkinsoniana				x	x	x	x	x	x	x	x	x	x	x	x	x
	Xanthosia candida				x	x	x	x	x	x	x	x	x	x	x	x	x
	Xanthosia ciliata					x									x		x
	Xanthosia fruticulosa					x				x							
	Xanthosia huegelii				x	x	x	x	x	x	x	x	x	x	x	x	x
	Xanthosia singuliflora				x	x		x		x			x	x	x		
	Xanthosia tasmanica						x								x		
	Xanthosia sp.						x								x		x
	Apiaceae sp.							x			x						
Apocynaceae	* *Asclepias curassavica*					x											
	* *Gomphocarpus fruticosus*					x									x		
	Parsonsia diaphanophleba	P4				x											
	* *Vinca major*					x											
Araceae	* *Zantedeschia aethiopica*					x											

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Araliaceae	*Hydrocotyle alata*					x											
	Hydrocotyle callicarpa				x	x	x								x		
	Hydrocotyle diantha						x										
	Trachymene coerulea subsp. *coerulea*					x											
	Trachymene pilosa					x	x	x		x	x		x	x	x	x	x
Asparagaceae	*Acanthocarpus canaliculatus*					x											
	Acanthocarpus preissii					x											
	Dichopogon capillipes					x	x								x		
	Dichopogon preissii								x								
	* *Lachenalia flava*					x											
	Laxmannia grandiflora								x								
	Laxmannia minor					x											
	Laxmannia sessiliflora														x		
	Laxmannia sessiliflora subsp. *australis*														x		
	Laxmannia squarrosa				x	x	x	x		x	x		x	x	x		x
	Laxmannia sp.													x	x		x
	Lomandra brittanii				x	x	x	x		x	x	x	x		x	x	
	Lomandra caespitosa				x	x	x	x		x	x	x	x	x	x	x	x
	Lomandra drummondii					x		x	x	x	x	x	x	x	x	x	
	Lomandra effusa														x		
	Lomandra hermaphrodita				x	x	x	x	x	x	x	x	x	x	x	x	x
	Lomandra integra					x		x		x	x			x	x	x	x

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Family	Species	Data source															
		SCC	FCC	EPBC[A]	NatureMap[B] 10km	NatureMap[C] 20km	MCPL[D] 2006	MCPL[D] 2011	MCPL[D] 2019	MCPL[E] 2008	MCPL[E] 2009	MCPL[E] 2010	MCPL[E] 2012	O'Neill[F] 2009	Mapping Myara North[E] 2019/20	Plots Myara North[E] 2019/20	MCPL[G] 2022
Asparagaceae	*Lomandra micrantha*					x		x	x	x	x	x		x	x	x	x
(cont.)	*Lomandra micrantha* subsp. *micrantha*				x	x	x	x		x	x		x	x	x		
	Lomandra nigricans					x	x	x		x			x	x	x	x	x
	Lomandra odora					x	x			x				x	x	x	
	Lomandra pauciflora							x				x					
	Lomandra preissii					x	x	x	x	x	x		x	x	x	x	x
	Lomandra purpurea					x		x	x	x	x		x	x	x	x	
	Lomandra sericea					x		x	x	x	x	x	x	x	x		x
	Lomandra sonderi				x	x	x	x	x	x	x	x	x	x	x	x	x
	Lomandra spartea				x	x	x	x	x	x	x	x	x	x	x	x	x
	Lomandra suaveolens					x	x								x		
	Lomandra sp.				x	x	x	x	x	x	x	x	x	x	x		x
	Sowerbaea laxiflora					x	x								x		
	Thysanotus anceps	P3				x											
	Thysanotus arbuscula				x	x								x			
	Thysanotus asper					x											
	Thysanotus dichotomus					x	x	x	x	x	x	x	x		x	x	x
	Thysanotus fastigiatus					x		x	x	x	x	x	x	x	x		x
	Thysanotus manglesianus					x	x	x		x	x		x	x	x		
	Thysanotus multiflorus					x	x	x	x	x	x	x	x		x	x	x
	Thysanotus patersonii				x	x									x	x	
	Thysanotus scaber														x		
	Thysanotus sparteus					x		x				x	x			x	

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Family	Species	Data source														
		SCC	FCC	EPBC[A]	NatureMap[B] 10km	NatureMap[C] 20km	MCPL[D] 2006	MCPL[D] 2011	MCPL[D] 2019	MCPL[E] 2008	MCPL[E] 2009	MCPL[E] 2010	MCPL[E] 2012	O'Neill[F] 2009	Mapping Myara North [E]2019/20	Plots Myara North[E] 2019/20	MCPL[G] 2022
Asparagaceae	*Thysanotus tenellus*					x	x	x		x	x						
(cont.)	*Thysanotus thyrsoideus*					x	x	x		x	x				x	x	x
	Thysanotus triandrus					x				x			x				
	Thysanotus sp.						x	x		x	x	x	x		x		
	Asparagaceae sp.						x								x		
Asphodelaceae	*Bulbine semibarbata*					x											
Asteraceae	* *Arctotheca calendula*					x		x			x						
	Asteridea pulverulenta					x											
	Blennospora drummondii					x											
	Brachyscome ciliaris					x											
	Brachyscome iberidifolia				x	x	x	x				x					
	Brachyscome perpusilla				x	x											
	* *Cichorium intybus*					x											
	Cotula australis					x											
	* *Cotula coronopifolia*					x											
	* *Cotula turbinata*					x				x							
	Craspedia variabilis				x	x	x	x		x	x		x	x	x		
	* *Crepis foetida*					x											
	* *Crepis foetida* subsp. *foetida*					x											
	* *Dittrichia graveolens*								x								
	* *Erigeron sumatrensis*															x	

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Family	Species	Data source														
		SCC	FCC	EPBC[A]	NatureMap[B] 10km	NatureMap[C] 20km	MCPL[D] 2006	MCPL[D] 2011	MCPL[D] 2019	MCPL[E] 2008	MCPL[E] 2009	MCPL[E] 2010	MCPL[E] 2012	O'Neill[F] 2009	Mapping Myara North [E]2019/20	Plots Myara North[E] 2019/20	MCPL[G] 2022
Asteraceae (cont.)	* *Erigeron* sp.								x						x		
	Euchiton sphaericus					x										x	
	Gnephosis tenuissima						x										
	Hyalosperma cotula					x	x	x		x	x	x	x	x	x		x
	Hyalosperma demissum					x	x										
	* *Hypochaeris glabra*				x	x	x	x		x	x	x	x		x	x	
	* *Hypochaeris radicata*					x				x			x				
	* *Hypochaeris* sp.												x				
	Lagenophora huegelii				x	x	x	x		x	x	x	x	x	x	x	x
	* *Logfia gallica*					x											
	Millotia tenuifolia				x	x									x	x	
	Millotia tenuifolia var. *laevis*	P2				x											
	Millotia tenuifolia var. *tenuifolia*					x	x			x							
	Olearia cassiniae				x	x											
	Olearia lehmanniana					x											
	Olearia paucidentata				x	x	x			x				x	x		
	Olearia rudis					x											
	Panaetia lessonii					x		x				x			x		
	Pithocarpa corymbulosa	P3				x											
	Pithocarpa pulchella					x											
	Pithocarpa pulchella var. *pulchella*					x											
	Podolepis gracilis					x	x	x		x	x	x					
	Podolepis sp.						x								x		

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Family	Species	Data source														
		SCC	FCC	EPBC[A]	NatureMap[B] 10km	NatureMap[C] 20km	MCPL[D] 2006	MCPL[D] 2011	MCPL[D] 2019	MCPL[E] 2008	MCPL[E] 2009	MCPL[E] 2010	MCPL[E] 2012	O'Neill[F] 2009	Mapping Myara North [E]2019/20	Plots Myara North[E] 2019/20	MCPL[G] 2022
Asteraceae (cont.)	*Podotheca angustifolia*					x	x								x		
	Podotheca gnaphalioides							x			x				x		
	Podotheca sp.														x		
	# *Pseudognaphalium luteoalbum*						x	x		x					x	x	
	Pterochaeta paniculata				x	x	x	x	x	x	x	x	x	x	x		x
	Pterochaeta sp.									x							
	Quinetia urvillei				x	x									x		
	Rhodanthe citrina					x	x	x		x	x						
	Rhodanthe corymbosa					x											
	Rhodanthe manglesii				x	x											
	* *Senecio diaschides*					x	x	x	x	x	x		x	x	x	x	x
	Senecio gilbertii	P1				x											
	Senecio glossanthus				x	x											
	Senecio hispidulus						x	x		x	x	x	x	x	x	x	
	Senecio leucoglossus	P4			x	x		x	x	x	x	x	x			x	x
	Senecio multicaulis subsp. *multicaulis*				x	x											
	Senecio pinnatifolius						x	x			x						
	Senecio pinnatifolius var. *latilobus*					x											
	Senecio quadridentatus					x	x	x	x	x	x	x	x	x	x	x	x
	* *Senecio vulgaris*							x		x	x	x	x	x			
	Senecio sp.						x	x	x	x	x	x	x	x	x		x
	Siloxerus filifolius					x	x										
	Siloxerus humifusus					x	x	x		x	x	x			x		

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Family	Species	Data source														
		SCC	FCC	EPBC[A]	NatureMap[B] 10km	NatureMap[C] 20km	MCPL[D] 2006	MCPL[D] 2011	MCPL[D] 2019	MCPL[E] 2008	MCPL[E] 2009	MCPL[E] 2010	MCPL[E] 2012	O'Neill[F] 2009	Mapping Myara North [E]2019/20	Plots Myara North[E] 2019/20	MCPL[G] 2022
Asteraceae (cont.)	*Siloxerus multiflorus*					x									x		
	* *Sonchus asper*					x											
	* *Sphaeromorphaea australis*					x											
	* *Symphyotrichum squamatum*					x											
	* *Tagetes erecta*					x											
	* *Tolpis barbata*					x								x			
	* *Ursinia anthemoides*					x		x		x	x				x		
	* *Ursinia anthemoides* subsp. *anthemoides*					x											
	* *Vellereophyton dealbatum*					x	x										
	* *Washingtonia filifera*					x											
	Trichocline spathulata				x	x	x	x	x	x	x	x	x	x	x	x	x
	Waitzia suaveolens var. *suaveolens*						x					x	x				
	Waitzia sp.							x									
	Xerochrysum macranthum				x	x											
	* Asteraceae sp.						x	x	x		x	x		x	x		x
Bartramiaceae	*Bartramia breutelii*					x											
	Bartramia pseudostricta				x	x											
	Breutelia affinis					x											
	Philonotis australiensis					x											
Berberidaceae	* *Nandina domestica*					x											

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Boraginaceae	*Halgania corymbosa*	P3				x											
Boryaceae	*Borya constricta*					x											
	Borya scirpoidea					x							x				
	Borya sphaerocephala				x	x	x		x	x			x	x	x		x
Brassicaceae	* *Brassica tournefortii*							x			x						
	* *Raphanus raphanistrum*					x											
Bryaceae	*Gemmabryum australe*					x											
	Gemmabryum sullivanii					x											
	Ptychostomum angustifolium					x											
	Rosulabryum albolimbatum					x											
	Rosulabryum campylothecium				x	x											
	Rosulabryum torquescens				x	x											
Byblidaceae	*Byblis gigantea*	P3				x											
Campanulaceae	*Isotoma hypocrateriformis*					x	x	x		x	x		x		x	x	x
	Lobelia anceps					x											
	Lobelia gibbosa					x		x				x	x				
	Lobelia heterophylla					x		x			x						
	Lobelia rarifolia					x											

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Campanulaceae	*Lobelia rhombifolia*					x		x		x	x						
(cont.)	*Lobelia rhytidosperma*					x											
	Lobelia tenuior						x										
	Lobelia sp.								x								
	* *Monopsis debilis* var. *depressa*					x											
	Wahlenbergia gracilenta					x											
	Wahlenbergia multicaulis					x											
	Wahlenbergia preissii					x								x		x	
	Wahlenbergia stricta subsp. *stricta*				x	x											
	Wahlenbergia sp.						x										
Caprifoliaceae	* *Lonicera japonica*					x											
Caryophyllaceae	* *Petrorhagia dubia*					x											
	* *Silene gallica*					x											
	* *Silene gallica* var. *quinquevulnera*					x											
	* *Stellaria media*					x											
Casuarinaceae	*Allocasuarina fraseriana*				x	x		x	x	x	x	x	x	x	x	x	x
	Allocasuarina huegeliana					x							x				
	Allocasuarina humilis				x	x	x	x	x	x	x	x	x	x	x		x
	Allocasuarina microstachya														x		
	Allocasuarina sp.								x				x				

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Celastraceae	*Stackhousia monogyna*					x		x		x	x		x	x	x	x	x
	Stackhousia pubescens				x	x											
	Stackhousia scoparia					x											
	Stackhousia sp. Red-blotched corolla (A. Markey 911)	P3				x											
	Stackhousia sp.						x										
	Tripterococcus brunonis					x	x	x		x	x		x	x	x	x	x
Centrolepidaceae	*Aphelia brizula*					x											
	Aphelia cyperoides				x	x	x									x	
	Aphelia sp. Albany (B.G. Briggs 596)					x											
	Centrolepis aristata					x	x								x	x	
	Centrolepis caespitosa					x											
	Centrolepis drummondiana					x											
	Centrolepis glabra					x											
	Centrolepis inconspicua					x											
	Centrolepis pilosa					x	x										
	Centrolepis polygyna				x	x											
	Centrolepis sp.						x		x								
Colchicaceae	*Burchardia congesta*				x	x	x	x	x	x	x		x	x	x	x	
	Burchardia multiflora					x									x		
	Burchardia sp.														x		
	Wurmbea dioica					x									x		

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Family		Species	Data source														
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Colchicaceae		*Wurmbea dioica* subsp. *alba*				x	x	x										
(cont.)		*Wurmbea* sp.						x								x		
Convolvulaceae	*	*Cuscuta epithymum*					x											
Crassulaceae		*Crassula colorata* var. *colorata*					x											
		Crassula decumbens var. *decumbens*					x											
		Crassula exserta					x											
		Crassula extrorsa					x											
	*	*Crassula natans* var. *minor*					x											
Cupressaceae	#	*Callitris pyramidalis*					x									x		
Cyatheaceae	PL	*Sphaeropteris cooperi*					x				x							
Cyperaceae		*Caustis dioica*														x	x	
		Chaetospora subbulbosa					x											
		Chorizandra enodis					x	x								x		
		Cyathochaeta avenacea				x	x	x	x	x	x	x	x	x	x	x	x	x
		Cyathochaeta teretifolia	P3				x				x							
	*	*Cyperus brevifolius*					x											
	*	*Cyperus tenellus*					x											

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Cyperaceae	*Cyperus vaginatus*					x											
(cont.)	*Gahnia aristata*				x	x			x					x	x		
	Gahnia decomposita					x	x	x	x	x	x	x	x	x	x	x	x
	Gahnia trifida					x	x	x		x							
	Isolepis cernua														x		
	Isolepis cernua var. *cernua*					x											
	Isolepis cernua var. *setiformis*					x	x										
	Isolepis congrua					x											
	Isolepis cyperoides					x											
	* *Isolepis marginata*					x	x	x			x				x	x	
	Isolepis oldfieldiana					x											
	Isolepis sp.						x										
	Lepidosperma apricola				x	x											
	Lepidosperma asperatum					x									x		
	Lepidosperma carphoides					x											
	Lepidosperma costale												x				
	Lepidosperma drummondii									x				x			
	Lepidosperma effusum												x				
	Lepidosperma gracile							x			x	x	x		x		
	Lepidosperma leptostachyum				x	x		x		x	x	x	x	x	x		
	Lepidosperma longitudinale					x	x								x	x	

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Cyperaceae	*Lepidosperma pruinosum*					x											
(cont.)	*Lepidosperma pubisquameum*				x	x	x	x		x	x		x	x	x	x	
	Lepidosperma pubisquameum sens. lat.								x								
	Lepidosperma scabrum					x											
	Lepidosperma squamatum				x	x	x	x	x	x	x	x	x	x	x	x	x
	Lepidosperma striatum					x				x				x			
	Lepidosperma tenue						x	x	x	x	x	x	x	x	x	x	x
	Lepidosperma tetraquetrum					x	x	x	x	x	x	x	x	x	x		x
	Lepidosperma tuberculatum					x			x	x			x	x			
	Lepidosperma sp. Gosnells (A. Markey 1145)					x											
	Lepidosperma sp. Margaret River (B.J. Lepschi 1841)					x											
	Lepidosperma sp.				x	x									x	x	x
	Machaerina acuta					x											
	Machaerina arthrophylla					x											
	Machaerina articulata												x				
	Machaerina juncea					x	x										
	Machaerina laxa					x											
	Machaerina preissii					x											
	Machaerina rubiginosa					x											
	Machaerina vaginalis				x	x		x			x				x		
	Mesomelaena graciliceps					x				x				x	x	x	
	Mesomelaena pseudostygia					x											
	Mesomelaena stygia															x	

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Cyperaceae	*Mesomelaena stygia* subsp. *stygia*					x											
(cont.)	*Mesomelaena tetragona*				x	x	x	x	x	x	x		x	x	x	x	x
	Morelotia australiensis	T	V			x											
	Morelotia octandra				x	x	x	x	x	x	x	x	x	x	x	x	x
	Netrostylis sp. Jarrah Forest (R. Davis 7391)				x	x	x	x	x	x	x	x	x	x	x	x	x
	Schoenus armeria					x											
	Schoenus asperocarpus					x											
	Schoenus bifidus					x	x										
	Schoenus brevisetis					x											
	Schoenus caespititius					x											
	Schoenus clandestinus				x	x	x			x				x	x		
	Schoenus discifer					x									x		
	Schoenus efoliatus					x											
	Schoenus grammatophyllus					x											
	Schoenus laevigatus					x											
	Schoenus nanus					x	x										
	Schoenus odontocarpus					x	x										
	Schoenus plumosus					x											
	Schoenus rigens					x											
	Schoenus sculptus					x											
	Schoenus subfascicularis						x							x			
	Schoenus subflavus					x											
	Schoenus tenellus					x											

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Cyperaceae	*Schoenus unispiculatus*					x	x										
(cont.)	*Schoenus variicellae*					x											
	Schoenus sp. smooth culms (K.R. Newbey 7823)					x											
	Schoenus sp.						x	x				x		x	x		
	Tricostularia compressa				x												
	Tricostularia neesii					x											
	Cyperaceae sp.						x							x	x		
Dasypogonaceae	*Calectasia grandiflora*	P2				x											
	Calectasia narragara					x											
	Dasypogon bromeliifolius				x	x		x			x				x		
	Kingia australis					x			x	x			x	x	x		x
Dennstaedtiaceae	*Pteridium esculentum*					x	x	x	x	x	x	x	x	x	x	x	x
	Pteridium esculentum subsp. *esculentum*					x											
Dicranaceae	*Campylopus bicolor* var. *bicolor*				x	x											
	Campylopus clavatus					x											
	* *Campylopus introflexus*				x	x											
Dilleniaceae	*Hibbertia acerosa*				x	x	x	x	x	x	x	x	x	x	x	x	x
	Hibbertia amplexicaulis				x	x	x	x	x	x	x	x	x	x	x	x	x
	Hibbertia aurea				x	x											

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Dilleniaceae	*Hibbertia commutata*				x	x	x	x	x	x	x	x	x	x	x	x	x
(cont.)	*Hibbertia diamesogenos*				x	x	x	x			x		x	x			
	Hibbertia glomerata subsp. *darlingensis*					x											
	Hibbertia glomerata subsp. *glomerata*									x							
	Hibbertia huegelii					x		x		x	x		x	x	x	x	
	Hibbertia hypericoides					x	x	x		x	x	x	x	x	x	x	x
	Hibbertia hypericoides subsp. *hypericoides*				x	x											
	Hibbertia lasiopus					x		x		x	x	x	x	x	x		x
	Hibbertia lineata															x	
	Hibbertia montana					x											
	Hibbertia mylnei					x								x			
	Hibbertia nymphaea					x											
	Hibbertia ovata				x	x	x	x	x	x	x	x	x		x		x
	Hibbertia perfoliata				x	x		x	x	x	x		x	x	x	x	x
	Hibbertia pilosa					x		x			x			x	x		
	Hibbertia polyancistra	P1				x											
	Hibbertia polystachya													x			
	Hibbertia quadricolor				x	x	x	x		x					x	x	
	Hibbertia serrata				x	x											
	Hibbertia silvestris								x	x			x		x		x
	Hibbertia spicata					x											
	Hibbertia stellaris				x	x									x		
	Hibbertia striata					x										x	

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Family	Species	Data source														
		SCC	FCC	EPBC[A]	NatureMap[B] 10km	NatureMap[C] 20km	MCPL[D] 2006	MCPL[D] 2011	MCPL[D] 2019	MCPL[E] 2008	MCPL[E] 2009	MCPL[E] 2010	MCPL[E] 2012	O'Neill[F] 2009	Mapping Myara North[E] 2019/20	Plots Myara North[E] 2019/20	MCPL[G] 2022
Dilleniaceae	*Hibbertia subvaginata*					x	x			x							
(cont.)	*Hibbertia vaginata*					x		x			x						
	Hibbertia sp.				x	x			x						x	x	x
Dioscoreaceae	*Dioscorea hastifolia*					x											
Ditrichaceae	*Ditrichum difficile*				x	x											
	Eccremidium pulchellum				x	x											
	Pleuridium ecklonii					x											
Droseraceae	*Drosera bulbosa*						x										
	Drosera callistos					x											
	Drosera collina					x											x
	Drosera drummondii					x											
	Drosera erythrorhiza					x	x			x			x	x	x	x	
	Drosera gigantea					x	x	x			x		x				
	Drosera glanduligera				x	x									x		
	Drosera hyperostigma				x	x		x			x			x			
	Drosera intricata				x	x											
	Drosera leucoblasta						x										
	Drosera macrantha					x	x						x		x		
	Drosera mannii					x											

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Droseraceae	*Drosera marchantii*					x											
(cont.)	*Drosera menziesii*					x	x						x				
	Drosera micrantha					x											
	Drosera microphylla					x											
	Drosera myriantha					x											
	Drosera nitidula				x	x											
	Drosera occidentalis	P4			x	x											
	Drosera oreopodion	P1				x											
	Drosera paleacea	P1					x										
	Drosera pallida				x	x	x			x	x			x			
	Drosera platystigma					x	x	x			x		x	x			
	Drosera porrecta				x	x											
	Drosera pulchella				x	x	x									x	
	Drosera purpurascens				x	x											
	Drosera rosulata					x	x										
	Drosera scorpioides				x	x											
	Drosera silvicola				x	x							x				
	Drosera spilos				x	x											
	Drosera squamosa				x	x											
	Drosera stolonifera					x	x			x				x	x	x	
	Drosera stricticaulis				x	x											
	Drosera subhirtella				x	x											
	Drosera sp. Branched styles (S.C. Coffey 193)					x											

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Droseraceae	*Drosera* sp.						x	x	x	x				x	x	x	x
(cont.)	*Drosera* sp. (climbing)																x
	Drosera sp. 2																x
Elaeocarpaceae	*Platytheca galioides*									x					x		
	Tetratheca affinis				x	x											
	Tetratheca hirsuta				x	x	x	x	x	x	x	x	x	x	x	x	x
	Tetratheca hirsuta subsp. *hirsuta*				x	x											
	Tetratheca hirsuta subsp. *viminea*				x	x											
	Tetratheca hispidissima				x	x		x				x	x				
	Tetratheca nuda					x	x										
	Tetratheca phoenix	P2			x	x								x			
	Tetratheca setigera							x			x						
	Tetratheca sp.														x		
	Tremandra diffusa									x			x				
Ericaceae	*Andersonia aristata*					x							x	x	x		
	Andersonia involucrata					x								x			
	Andersonia lehmanniana					x							x	x	x	x	x
	Andersonia lehmanniana subsp. *lehmanniana*					x				x			x	x	x		
	Andersonia sp. Audax (F. Hort, B. Hort & J. Hort 3179)	P3			x	x											
	Andersonia sp. Saxatilis (F. & J. Hort 3324)	P1			x	x											

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Ericaceae	*Andersonia latiflora*													x			
(cont.)	*Andersonia* sp.								x	x			x				
	Astroloma sp.						x						x				
	Conostephium preissii					x											
	Leucopogon australis							x			x			x	x		x
	Leucopogon capitellatus				x	x	x	x	x	x	x	x	x	x	x	x	x
	Leucopogon darlingensis subsp. *darlingensis*				x	x											
	Leucopogon glabellus				x	x		x		x	x		x	x	x		
	Leucopogon gracillimus					x				x							
	Leucopogon hirsutus							x			x						
	Leucopogon parviflorus															x	
	Leucopogon polymorphus													x			
	Leucopogon pulchellus				x	x		x		x	x	x	x				
	Leucopogon sprengelioides					x	x									x	
	Leucopogon tenuis					x									x		
	Leucopogon verticillatus				x	x		x	x	x	x	x	x	x	x	x	x
	Leucopogon sp. Parkerville (A. Meebold 11654)				x	x											
	Leucopogon sp. Wandering (F. Hort 419)				x												
	Leucopogon sp.						x	x	x	x			x	x	x		
	Lysinema ciliatum					x									x		
	Lysinema elegans														x		
	Lysinema pentapetalum														x		
	Styphelia compacta					x											

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Ericaceae	*Styphelia discolor*				x	x	x	x	x	x	x	x	x	x	x	x	x
(cont.)	*Styphelia epacridis*														x		
	Styphelia erectifolia														x		
	Styphelia erubescens									x							
	Styphelia nitens				x	x	x	x	x	x	x	x	x	x	x	x	x
	Styphelia pallida				x	x	x	x	x	x	x	x	x	x	x	x	x
	Styphelia propinqua				x	x	x	x	x	x	x	x	x	x	x	x	x
	Styphelia prostrata						x										
	Styphelia stricta				x	x	x						x	x	x		
	Styphelia tenuiflora				x	x	x	x	x	x	x	x	x	x	x	x	x
	Styphelia tortifolia				x	x											
	Styphelia sp.								x						x		x
	Ericaceae sp.						x			x					x		
Euphorbiaceae	*Amperea simulans*				x	x		x		x	x				x		
	Beyeria lechenaultii				x	x											
	* *Euphorbia helioscopia*					x											
	* *Euphorbia terracina*					x											
	* *Lathyrus tingitanus*					x											
	Monotaxis grandiflora					x		x			x			x			
	Monotaxis grandiflora var. *grandiflora*				x	x	x							x		x	
	Monotaxis occidentalis						x	x	x	x	x		x	x	x		x
	Ricinocarpos graniticus					x											

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Euphorbiaceae	*Stachystemon vermicularis*				x	x							x	x			x
(cont.)	*Stachystemon virgatus*														x		
Fabaceae	*Acacia alata*				x	x		x	x	x	x	x		x	x	x	x
	Acacia alata var. *alata*				x	x	x	x		x	x		x		x		
	Acacia applanata				x	x							x	x	x	x	x
	Acacia barbinervis					x	x	x	x	x	x				x	x	
	Acacia barbinervis subsp. *barbinervis*				x	x		x		x	x				x		
	Acacia browniana					x		x		x	x	x	x	x	x		x
	Acacia browniana var. *endlicheri*												x	x	x		
	Acacia browniana var. *intermedia*													x	x		
	Acacia browniana var. *obscura*													x	x		
	# *Acacia celastrifolia*					x		x		x	x		x	x	x		
	Acacia cuneifolia	P4				x											
	* *Acacia dealbata* subsp. *dealbata*								x								
	* *Acacia decurrens*					x											
	Acacia dentifera					x		x		x		x	x				
	Acacia divergens				x	x	x	x	x	x	x	x	x	x	x	x	x
	Acacia drewiana subsp. *drewiana*					x											
	Acacia drummondii									x						x	
	Acacia drummondii subsp. *affinis*	P3				x				x	x						
	Acacia drummondii subsp. *candolleana*				x	x	x	x	x	x	x		x	x	x	x	x
	Acacia drummondii subsp. *drummondii*							x		x			x	x			x

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Fabaceae	*Acacia drummondii* subsp. *elegans*					x											
(cont.)	*Acacia ephedroides*				x	x			x	x			x	x	x		
	Acacia extensa				x	x	x	x	x	x	x	x	x	x	x	x	x
	* *Acacia floribunda*					x											
	Acacia gemina				x	x									x		
	Acacia horridula	P3				x									x		
	Acacia incrassata					x											
	Acacia incurva				x	x	x							x	x		x
	* *Acacia iteaphylla*					x											
	# *Acacia lasiocarpa*					x											
	Acacia lasiocarpa var. *bracteolata*					x											
	Acacia lateriticola				x	x	x	x	x	x	x	x	x	x	x	x	x
	Acacia latipes subsp. *latipes*					x											
	* *Acacia longifolia*									x					x		
	* *Acacia longifolia* subsp. *longifolia*														x		
	# *Acacia microbotrya*				x	x											
	* *Acacia mollifolia*					x											
	Acacia multispicata					x				x			x		x		
	Acacia nervosa				x	x	x	x	x	x	x	x	x	x	x		x
	Acacia obovata					x			x	x			x	x	x		
	Acacia oncinophylla														x		
	Acacia oncinophylla subsp. *oncinophylla*	P3				x											
	* *Acacia podalyriifolia*					x				x							

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Fabaceae (cont.)	*Acacia preissiana*				x	x	x	x		x	x	x	x	x	x		
	Acacia pulchella					x	x	x	x	x	x	x	x	x	x	x	x
	Acacia pulchella var. *glaberrima*				x	x	x	x		x		x			x		
	Acacia pulchella var. *goadbyi*				x	x											
#	*Acacia pulchella* var. *pulchella*				x	x	x								x		
	Acacia pulchella var. *reflexa*				x	x											
	Acacia saligna					x	x		x						x	x	x
	Acacia saligna subsp. Wheatbelt (B.R. Maslin 8602)					x											
	Acacia sclerophylla					x											
	Acacia sessilis					x											
	Acacia stenoptera				x	x	x						x	x	x	x	
	Acacia subflexuosa subsp. *subflexuosa*					x											
	Acacia ?*sulcata* var. *platyphylla*												x				
	Acacia teretifolia					x											
	Acacia tetragonocarpa					x											
#	*Acacia trigonophylla*					x								x	x		
	Acacia ulicina					x											
	Acacia urophylla				x	x		x	x	x	x	x	x		x	x	x
	Acacia varia									x			x	x			x
	Acacia varia var. *varia*					x		x		x				x			
	Acacia willdenowiana				x	x	x	x	x	x	x	x	x		x		x
	Acacia sp.					x	x	x	x	x	x	x			x		
	Aotus cordifolia					x	x			x				x		x	

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Fabaceae	*Aotus gracillima*														x		
(cont.)	*Bossiaea angustifolia*				x	x											x
	Bossiaea aquifolium					x		x		x	x	x	x		x	x	x
	Bossiaea aquifolium subsp. *aquifolium*				x	x	x		x	x				x			
	Bossiaea eriocarpa					x		x		x			x		x		x
	Bossiaea modesta	P2				x											
	Bossiaea ornata				x	x	x	x	x	x	x	x	x	x	x	x	x
	Bossiaea pulchella				x	x									x		
	Bossiaea rufa					x											
	Bossiaea spinescens															x	
	Bossiaea sp.									x							
	Callistachys lanceolata							x			x	x	x	x	x		x
	Chorizema cordatum					x		x	x	x	x		x	x	x	x	x
	Chorizema dicksonii				x	x	x			x					x		
	Chorizema ilicifolium						x										
	Chorizema nanum					x											
	Chorizema rhombeum					x		x		x	x						
	Chorizema ulotropis	P4				x											
	Chorizema retrorsum													x			
	Cristonia biloba subsp. *biloba*					x											
	Daviesia brachyphylla					x											
	Daviesia cordata				x	x		x	x		x				x		x
	Daviesia costata				x	x											

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Fabaceae	*Daviesia decipiens*					x											
(cont.)	*Daviesia decurrens*					x		x	x	x	x	x	x	x	x	x	x
	Daviesia decurrens subsp. *decurrens*				x	x											
	Daviesia divaricata									x							
	Daviesia hakeoides subsp. *subnuda*				x												
	Daviesia horrida				x	x	x	x	x	x		x	x	x	x	x	x
	Daviesia incrassata						x	x		x	x	x	x	x	x		x
	Daviesia inflata													x			
	Daviesia longifolia												x	x			
	Daviesia nudiflora subsp. *nudiflora*					x											
	Daviesia physodes					x		x			x		x	x			
	Daviesia preissii				x	x		x	x	x	x		x	x	x		x
	Daviesia rhombifolia				x	x		x			x		x	x	x		x
	Daviesia sp.							x	x			x			x		
	Dillwynia laxiflora				x	x	x								x		
	Dillwynia sp.							x			x						
	Eutaxia parviflora					x								x			
	Eutaxia virgata					x							x				
	Gastrolobium bilobum												x	x	x		
	Gastrolobium calycinum												x	x	x		x
	Gastrolobium capitatum					x	x										
	Gastrolobium dilatatum					x								x			
	Gastrolobium ebracteolatum					x		x			x	x					

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Family	Species	Data source														
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Fabaceae	*Gastrolobium retusum*														x		
(cont.)	*Gastrolobium spathulatum*				x	x											
	Gastrolobium spinosum					x	x			x			x	x	x	x	x
	Gastrolobium villosum				x	x			x				x		x	x	x
	Gastrolobium sp. Asperum (F. Hort 2864)	P3			x	x											
	Gastrolobium sp.														x		
	Gompholobium aristatum					x											
	Gompholobium capitatum				x	x									x		
	Gompholobium confertum					x	x										
	Gompholobium cyaninum				x	x				x			x	x	x		x
	Gompholobium knightianum				x	x		x	x	x	x	x	x	x	x	x	x
	Gompholobium marginatum				x	x	x	x	x	x	x	x	x	x		x	x
	Gompholobium polymorphum				x	x	x	x	x	x	x	x	x	x	x	x	x
	Gompholobium preissii					x	x	x	x	x	x		x	x	x	x	x
	Gompholobium scabrum														x		
	Gompholobium tomentosum					x			x	x			x		x	x	x
	Gompholobium sp.						x			x				x	x	x	
	Hardenbergia comptoniana							x		x		x	x		x		
	Hardenbergia sp.							x						x			
	Hovea chorizemifolia				x	x	x	x	x	x	x	x	x	x	x	x	x
	Hovea pungens					x									x		
	Hovea trisperma				x	x		x	x	x	x	x	x	x	x	x	
	Hovea trisperma var. *grandiflora*					x									x		

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Fabaceae	*Hovea trisperma* var. *trisperma*						x										
(cont.)	*Hovea* sp.						x								x		
	Isotropis cuneifolia															x	
	Isotropis cuneifolia subsp. *cuneifolia*						x		x						x		
	Jacksonia alata				x	x		x			x					x	
	Jacksonia furcellata					x		x			x				x		x
	Jacksonia lehmannii					x											
	Jacksonia restioides					x											
	Jacksonia sternbergiana				x	x											
	Kennedia carinata					x				x							
	Kennedia coccinea				x	x	x	x	x	x	x	x	x	x	x	x	x
	Kennedia microphylla					x											
	Kennedia prostrata				x	x	x	x	x	x	x		x	x	x	x	x
	Kennedia stirlingii					x											
	# *Labichea lanceolata*					x											
	# *Labichea lanceolata* subsp. *lanceolata*					x											
	Labichea punctata				x	x	x	x	x	x	x		x		x	x	x
	Latrobea tenella						x										
	* *Lotus angustissimus*					x											
	* *Lotus subbiflorus*					x											
	* *Lotus uliginosus*					x											
	* *Lupinus cosentinii*					x											

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Fabaceae	* *Lupinus luteus*					x											
(cont.)	* *Medicago* sp.						x										
	Mirbelia dilatata				x	x	x	x	x	x	x	x	x	x	x	x	x
	Mirbelia floribunda					x											
	Mirbelia spinosa					x								x			
	* *Ornithopus pinnatus*					x											
	# *Paraserianthes lophantha*							x	x		x	x		x	x		
	# *Paraserianthes lophantha* subsp. *lophantha*				x	x	x	x		x	x		x				
	* *Podalyria sericea*					x											
	Pultenaea ochreata					x											
	Pultenaea reticulata				x												
	* *Robinia pseudoacacia*												x				
	Sphaerolobium linophyllum					x		x			x						
	Sphaerolobium macranthum					x										x	
	Sphaerolobium medium				x	x	x	x	x	x	x	x	x		x	x	x
	Sphaerolobium vimineum						x	x			x						
	Sphaerolobium sp.						x									x	
	Templetonia drummondii				x	x	x										
	PL *Tipuana tipu*									x							
	* *Trifolium angustifolium* var. *angustifolium*					x											
	* *Trifolium arvense*						x										
	* *Trifolium arvense* var. *arvense*					x											
	* *Trifolium campestre*					x											

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Fabaceae (cont.)	* *Trifolium cernuum*					x											
	* *Trifolium dubium*					x											
	* *Trifolium incarnatum* var. *incarnatum*					x											
	* *Trifolium ornithopodioides*					x											
	* *Trifolium repens*									x							
	* *Trifolium* sp.												x				
	* *Vicia sativa*					x											
	Viminaria juncea				x	x	x	x			x	x	x		x		
	Fabaceae sp.						x								x		
Fissidentaceae	*Fissidens curvatus* var. *curvatus*				x	x											
	Fissidens leptocladus					x											
	Fissidens megalotis					x											
	Fissidens taylorii var. *taylorii*					x											
Funariaceae	*Entosthodon subnudus*					x											
	Funaria hygrometrica					x											
Gentianaceae	* *Centaurium erythraea*				x	x	x	x		x		x	x				
	* *Cicendia filiformis*					x											
Geraniaceae	* *Erodium botrys*					x											
	Erodium sp.								x								

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Geraniaceae	* *Pelargonium* x *domesticum*					x											
(cont.)	*Pelargonium littorale*					x								x	x		
	Geranium retrorsum					x											
	Geranium sp.						x										
Goodeniaceae	*Anthotium junciforme*					x											
	Anthotium sp. Darling Range (F. Hort & B. Hort 2431)	P1				x											
	Dampiera alata				x	x	x	x		x	x			x	x		x
	Dampiera hederacea					x	x	x	x	x	x		x				x
	Dampiera linearis				x	x	x	x	x	x	x	x	x	x	x	x	x
	Dampiera sp.														x		x
	Goodenia claytoniacea				x	x											
	Goodenia coerulea				x	x	x										
	Goodenia drummondii subsp. *megaphylla*					x											
	Goodenia ?filiformis						x										
	Goodenia micrantha				x	x											
	Goodenia pulchella														x		
	Goodenia trinervis				x	x									x		x
	Goodenia verreauxii	P4				x											
	Lechenaultia biloba				x	x	x	x	x	x	x	x	x	x	x	x	x
	Lechenaultia expansa				x	x											
	Lechenaultia floribunda					x											

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Goodeniaceae	*Lechenaultia formosa*									x							
(cont.)	*Scaevola calliptera*				x	x	x	x	x	x	x	x	x	x	x	x	x
	Scaevola glandulifera				x	x	x							x			
	Scaevola pilosa				x	x							x			x	
	Scaevola repens				x												
	Scaevola striata				x	x											
	Scaevola sp.						x							x			
	Goodeniaceae sp.						x								x		
Grimmiaceae	*Grimmia laevigata*				x	x											
	Grimmia pulvinata var. *africana*				x	x											
Haemodoraceae	*Anigozanthos bicolor* subsp. *bicolor*					x											
	Anigozanthos manglesii					x				x					x	x	x
	Anigozanthos manglesii subsp. *manglesii*					x											
	Anigozanthos viridis					x											
	Anigozanthos viridis subsp. *viridis*					x											
	Anigozanthos sp.					x		x			x			x	x		
	Conostylis aculeata					x									x		
	Conostylis aculeata subsp. *aculeata*					x		x		x	x						
	Conostylis aculeata subsp. *preissii*					x											
	Conostylis androstemma					x											
	Conostylis caricina subsp. *caricina*				x	x									x		

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Haemodoraceae	*Conostylis juncea*					x											
(cont.)	*Conostylis laxiflora*				x	x											
	Conostylis pusilla				x	x		x	x		x		x	x	x	x	x
	Conostylis serrulata				x	x	x	x	x	x	x	x	x	x	x	x	x
	Conostylis setigera				x	x		x	x	x	x	x	x	x	x	x	x
	Conostylis setigera subsp. *setigera*				x	x	x							x	x		
	Conostylis setosa				x	x	x	x	x	x	x	x	x	x	x	x	x
	Conostylis sp.					x	x	x	x	x	x			x	x		x
	Haemodorum discolor					x		x		x	x			x			
	Haemodorum laxum				x	x									x	x	
	Haemodorum simplex				x	x	x										
	Haemodorum sparsiflorum					x											x
	Haemodorum spicatum														x		
	Haemodorum sp.						x	x		x	x	x	x		x	x	x
	Phlebocarya ciliata					x							x				
	Tribonanthes australis					x	x								x		
	Tribonanthes brachypetala					x											
	Tribonanthes longipetala				x	x	x										
	Tribonanthes violacea				x	x											
	Haemodoraceae sp.							x			x	x					
Haloragaceae	*Glischrocaryon angustifolium*					x		x			x						
	Glischrocaryon aureum					x			x				x	x	x	x	

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Haloragaceae	*Glischrocaryon flavescens*					x											
(cont.)	*Gonocarpus benthamii*					x	x	x	x	x	x	x		x			
	Gonocarpus cordiger				x	x	x			x				x	x		x
	Gonocarpus diffusus					x		x			x				x		
	Gonocarpus nodulosus					x											
	?*Gonocarpus* sp.												x				
	Meionectes tenuifolia	P3				x	x										
Hedwigiaceae	*Hedwigidium integrifolium*					x											
Hemerocallidaceae	*Agrostocrinum hirsutum*				x	x		x	x	x	x	x	x	x	x		x
	Agrostocrinum scabrum					x	x									x	x
	Agrostocrinum sp.							x			x						
	Caesia micrantha					x	x								x		
	Caesia occidentalis					x	x										
	Caesia sp.						x			x							
	Chamaescilla corymbosa					x		x		x	x		x	x	x	x	x
	Chamaescilla corymbosa var. *corymbosa*				x	x	x	x			x			x			
	Corynotheca elongata													x			
	Corynotheca micrantha							x		x			x		x		
	Dianella revoluta				x	x	x	x	x	x	x	x	x	x	x	x	x
	Dianella revoluta var. *divaricata*				x	x				x			x				

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Hemerocallidaceae	*Hensmania turbinata*					x											
(cont.)	*Johnsonia lupulina*									x					x		
	Johnsonia pubescens subsp. *cygnorum*	P2				x											
	Johnsonia pubescens subsp. *pubescens*					x											
	Stypandra glauca				x	x							x	x	x		
	Tricoryne elatior				x	x	x	x		x	x	x		x	x	x	x
	Tricoryne humilis				x	x	x	x		x	x		x	x		x	
	Tricoryne sp.						x		x						x		
Hydrocharitaceae	*Ottelia ovalifolia*					x											
Hypericaceae	* *Hypericum perforatum*							x				x					
Hypoxidaceae	*Hypoxis* sp.						x										
	Pauridia gardneri					x											
	Pauridia glabella						x										
	Pauridia occidentalis					x											
	Pauridia occidentalis ?var. *occidentalis*						x										
	Pauridia occidentalis var. *quadriloba*						x										
	Pauridia vaginata var. *vaginata*					x											
	Pauridia gardneri									x							
	Pauridia sp.														x		

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Iridaceae	* *Babiana angustifolia*					x											
	* *Freesia alba* x *leichtlinii*					x											
	* *Gladiolus caryophyllaceus*					x											
	* *Gladiolus undulatus*					x											
	* *Ixia maculata*					x											
	* *Ixia polystachya*					x											
	* *Moraea flaccida*					x											
	* *Romulea rosea*					x	x										
	* *Sparaxis bulbifera*					x											
	* *Tritonia crocata*					x											
	* *Watsonia borbonica*					x											
	* *Watsonia meriana*					x									x		
	* *Watsonia meriana* var. *bulbillifera*					x											
	* *Watsonia meriana* var. *meriana*					x											
	Orthrosanthus laxus														x		
	Orthrosanthus laxus var. *laxus*					x											
	Patersonia babianoides					x	x	x		x	x	x	x	x		x	x
	Patersonia juncea				x	x	x								x	x	
	Patersonia maxwellii				x	x											
	Patersonia occidentalis				x	x	x	x	x	x	x	x	x	x	x	x	x
	Patersonia occidentalis var. *latifolia*					x											
	Patersonia occidentalis var. *occidentalis*				x	x											
	Patersonia pygmaea				x	x	x	x	x	x	x	x	x	x	x	x	x

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Family	Species	Data source															
		SCC	FCC	EPBC[A]	NatureMap[B] 10km	NatureMap[C] 20km	MCPL[D] 2006	MCPL[D] 2011	MCPL[D] 2019	MCPL[E] 2008	MCPL[E] 2009	MCPL[E] 2010	MCPL[E] 2012	O'Neill[F] 2009	Mapping Myara North [E]2019/20	Plots Myara North[E] 2019/20	MCPL[G] 2022
Iridaceae	*Patersonia rudis*				x	x		x	x	x	x	x	x	x	x	x	x
(cont.)	*Patersonia rudis* subsp. *rudis*				x	x	x			x			x				
	Patersonia umbrosa												x				
	Patersonia umbrosa var. *xanthina*					x											
	Patersonia sp.												x		x		x
	Iridaceae sp.														x		
Isoetaceae	*Isoetes australis*					x											
Juncaceae	* *Juncus articulatus*					x											
	* *Juncus bufonius*					x											
	* *Juncus capitatus*					x											
	Juncus holoschoenus					x											
	Juncus kraussii subsp. *australiensis*					x											
	* *Juncus microcephalus*					x											
	Juncus pallidus					x	x										
	Juncus planifolius					x											
	Juncus subsecundus					x											
	* *Juncus usitatus*					x											
	Juncus sp.												x		x		
Juncaginaceae	*Triglochin nana*					x											

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Lamiaceae	* *Lavandula stoechas*														x		
	* *Lavandula stoechas* subsp. *stoechas*					x											
	Hemiandra pungens				x	x				x			x		x	x	
	Hemiandra sp.														x		
	Hemigenia argentea				x	x											
	Hemigenia barbata													x			
	Hemigenia humilis					x											
	Hemigenia incana				x	x			x	x			x		x		
	Hemigenia parviflora					x											
	Hemigenia platyphylla	P4			x	x											
	Hemigenia pritzelii				x	x		x	x	x	x	x	x	x	x		x
	Hemigenia viscida					x									x		
	Hemigenia wandooana				x												
	Hemigenia rigida	P1					x							x			
	Hemigenia sp.														x		
	Hemiphora bartlingii				x	x			x				x				x
	Lachnostachys verbascifolia					x											
	* *Salvia verbenaca*					x											
Lauraceae	*Cassytha glabella*					x	x	x				x			x		
	Cassytha glabella forma casuarinae				x	x											
	Cassytha glabella forma glabella							x			x						
	Cassytha pomiformis					x							x				

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Lauraceae	*Cassytha racemosa*				x	x	x	x		x		x					
(cont.)	*Cassytha racemosa forma pilosa*							x			x						
	Cassytha racemosa forma racemosa				x	x		x		x	x			x			
	Cassytha sp.						x	x	x		x	x	x	x	x	x	x
Lentibulariaceae	*Utricularia inaequalis*				x	x	x										
	Utricularia multifida					x	x	x			x				x		
	Utricularia petertaylorii				x	x											
	Utricularia tenella					x	x										
	Utricularia violacea					x											
	Utricularia sp.						x										
Liliaceae	Liliaceae sp.						x										
Linaceae	*Linum marginale*					x											
	* *Linum trigynum*					x											
Lindsaeaceae	*Lindsaea linearis*				x	x	x	x	x	x	x		x	x	x	x	x
Loganiaceae	*Orianthera campanulata*					x							x				
	Orianthera serpyllifolia							x		x		x	x	x	x		x
	Orianthera serpyllifolia subsp. *angustifolia*				x	x	x	x		x							
	Orianthera serpyllifolia subsp. *serpyllifolia*					x		x				x					

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Family	Species	Data source															
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Loganiaceae	*Phyllangium divergens*					x											
(cont.)	*Phyllangium paradoxum*					x	x	x		x	x						
Loranthaceae	*Amyema miquelii*					x											
	Amyema sp.												x				
	Nuytsia floribunda					x		x		x	x				x		
Lycopodiaceae	*Phylloglossum drummondii*					x											
Macarthuriaceae	*Macarthuria australis*					x											
Malvaceae	* *Brachychiton populneus*					x											
	Commersonia corniculata					x											
	Lasiopetalum cardiophyllum	P4							x								x
	Lasiopetalum floribundum				x	x	x	x	x	x	x	x	x	x	x	x	x
	Lasiopetalum glabratum				x	x	x	x	x		x	x	x	x	x	x	x
	Lasiopetalum glutinosum				x									x			
	Lasiopetalum glutinosum subsp. *glutinosum*	P3				x											
	Lasiopetalum glutinosum subsp. *latifolium*					x								0			x
	Lasiopetalum pterocarpum	T	E	x		x											
	Lasiopetalum sp.														x		
	Thomasia foliosa					x									x		
	Thomasia grandiflora				x	x											

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Family		Species	Data source														
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Malvaceae		*Thomasia* ?*macrocalyx*								x								
(cont.)		*Thomasia macrocarpa*					x											
		Thomasia paniculata				x	x	x	x		x	x	x	x	x	x	x	x
		Thomasia pauciflora				x	x											
		?*Thomasia* sp.								x								
		Malvaceae sp.								x								
Menyanthaceae		*Ornduffia parnassifolia*						x	x			x						
Montiaceae		*Calandrinia calyptrata*					x											
		Calandrinia sp.						x										
Moraceae	*	*Ficus carica*					x											
Myrtaceae		*Agonis flexuosa*							x			x						
		Astartea affinis					x								x			
		Astartea leptophylla					x							x				
		Astartea scoparia				x	x	x	x	x	x	x	x	x	x	x	x	x
		Astartea zephyra					x											
		Babingtonia camphorosmae				x	x	x	x	x	x	x	x	x	x	x	x	x
		Beaufortia macrostemon					x							x				
		Callistemon glaucus					x		x			x						
	#	*Callistemon phoeniceus*					x											

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Myrtaceae	*Calothamnus lateralis*					x									x		
(cont.)	*Calothamnus planifolius*						x										
	* *Calothamnus quadrifidus*					x		x	x	x	x				x		
	* *Calothamnus quadrifidus* subsp. *homalophyllus*					x											
	* *Calothamnus quadrifidus* subsp. *quadrifidus*					x											
	Calothamnus rupestris				x	x		x		x	x				x		
	Calothamnus sanguineus				x	x			x						x		
	Calothamnus torulosus					x											
	Calothamnus sp.												x			x	
	Calytrix acutifolia					x											
	Calytrix angulata					x											x
	Calytrix aurea					x											
	Calytrix depressa				x	x			x	x			x		x		
	Calytrix flavescens					x		x				x			x		x
	Calytrix fraseri					x											
	Calytrix simplex subsp. *simplex*	P1				x											
	Calytrix simplex subsp. *suboppositifolia*					x											
	Calytrix variabilis					x									x		
	Calytrix sp.								x						x		x
	# *Chamelaucium uncinatum*					x											
	Corymbia calophylla				x	x	x	x	x	x	x	x	x	x	x	x	x
	Corymbia haematoxylon					x											
	* *Corymbia maculata*														x		

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Myrtaceae	*Darwinia citriodora*				x	x		x	x	x	x		x		x		
(cont.)	*Darwinia hortiorum*	P1			x	x											
	Darwinia thymoides				x	x											x
	Darwinia thymoides subsp. *thymoides*					x				x				x			x
	Darwinia sp.																x
	Eremaea asterocarpa subsp. *asterocarpa*					x											
	Eremaea pauciflora var. *pauciflora*					x											
	Ericomyrtus serpyllifolia				x	x											
	Eucalyptus aspersa				x												
PL	*Eucalyptus cypellocarpa*														x		
	Eucalyptus decurva				x	x											
	Eucalyptus drummondii				x	x				x			x		x		
	Eucalyptus laeliae					x											
#	*Eucalyptus lane-poolei*					x											
PL	*Eucalyptus maculata*									x							
	Eucalyptus marginata				x	x		x	x	x	x	x	x	x	x	x	x
	Eucalyptus marginata subsp. *marginata*				x	x	x										
	Eucalyptus marginata subsp. *thalassica*					x											
	Eucalyptus megacarpa					x		x	x	x	x	x	x	x	x		x
PL	*Eucalyptus microcorys*									x							
	Eucalyptus patens				x	x	x	x	x	x	x	x	x	x	x	x	x
PL	*Eucalyptus resinifera*																x

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Myrtaceae (cont.)	*Eucalyptus rudis*				x	x		x	x		x	x	x	x	x		x
	Eucalyptus rudis subsp. *rudis*					x	x	x				x					
	Eucalyptus wandoo					x		x			x			x	x		
	Eucalyptus wandoo subsp. *wandoo*					x											
	Eucalyptus sp.						x								x		
	Hypocalymma angustifolium				x	x	x	x	x	x	x	x	x	x	x	x	x
	Hypocalymma angustifolium subsp. Dandaragan plateau (S. Patrick 702A)					x											
	Hypocalymma cordifolium					x		x	x	x	x	x	x		x		x
	Hypocalymma robustum					x		x	x	x	x	x	x	x	x		x
	Hypocalymma strictum													x			
	Kunzea ericifolia						x	x		x	x						
	Kunzea glabrescens					x		x	x			x	x			x	
	Kunzea micrantha				x	x	x							x	x		
	Kunzea micrantha subsp. *micrantha*					x									x		
	Kunzea micrantha subsp. *petiolata*					x											
	Kunzea pulchella														x		
	Kunzea recurva					x	x			x				x	x	x	
	Kunzea sp.														x		
	Leptospermum erubescens				x	x		x	x	x	x		x	x	x	x	x
*	*Leptospermum laevigatum*					x			x	x					x		
	Leptospermum oligandrum																x
PL	*Melaleuca armillaris*																x

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Myrtaceae	PL *Melaleuca armillaris* subsp. *armillaris*														x		
(cont.)	*Melaleuca holosericea*					x											
	Melaleuca incana subsp. *incana*				x	x	x	x		x	x		x	x	x		x
	Melaleuca lateritia						x	x			x		x	x	x		x
	Melaleuca parviceps				x	x		x	x	x	x		x	x	x	x	x
	Melaleuca pauciflora						x	x		x	x				x		
	Melaleuca preissiana				x	x	x	x		x	x	x	x	x	x	x	x
	Melaleuca pungens					x											
	Melaleuca radula					x	x										
	Melaleuca rhaphiophylla					x		x			x	x		x	x		x
	Melaleuca scabra						x										
	Melaleuca seriata					x											
	Melaleuca subtrigona					x											
	Melaleuca trichophylla					x			x				x	x	x		
	Melaleuca viminea							x	x	x	x	x	x	x	x	x	x
	Melaleuca viminea subsp. *viminea*				x	x	x							x			x
	Melaleuca sp.						x			x					x		x
	Paragonis grandiflora					x											
	Pericalymma ellipticum				x	x		x	x	x	x	x	x	x	x	x	x
	Pericalymma ellipticum var. *ellipticum*					x	x			x							
	Pericalymma ellipticum var. *floridum*				x	x				x				x			
	Regelia ciliata					x	x										
	Taxandria linearifolia				x	x	x	x	x	x	x	x	x	x	x	x	x

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Myrtaceae	*Thryptomene australis* subsp. *australis*				x	x											
(cont.)	*Verticordia acerosa* var. *acerosa*					x											
	Verticordia acerosa var. *preissii*				x	x											
	Verticordia bifimbriata					x											
	Verticordia chrysantha				x	x											
	Verticordia densiflora														x		x
	Verticordia densiflora var. *cespitosa*					x											
	Verticordia densiflora var. *densiflora*					x							x	x	x		
	Verticordia endlicheriana var. *endlicheriana*				x	x											
	Verticordia fimbrilepis subsp. *fimbrilepis*	T	E	x		x											
	Verticordia huegelii													x			x
	Verticordia huegelii var. *decumbens*				x	x											
	Verticordia huegelii var. *huegelii*					x		x			x		x				
	Verticordia insignis subsp. *insignis*					x											
	Verticordia pennigera					x				x			x		x		x
	Verticordia plumosa					x							x		x	x	x
	Verticordia plumosa var. *ananeotes*	T	E			x											
	Verticordia plumosa var. *brachyphylla*					x							x				
	Verticordia plumosa var. *plumosa*					x		x	x	x	x	x	x	x	x		
	Verticordia ?serrata													x			
	Verticordia sp.												x		x		
	Myrtaceae sp.							x				x		x	x		x

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Family	Species	Data source														
		SCC	FCC	EPBC[A]	NatureMap[B] 10km	NatureMap[C] 20km	MCPL[D] 2006	MCPL[D] 2011	MCPL[D] 2019	MCPL[E] 2008	MCPL[E] 2009	MCPL[E] 2010	MCPL[E] 2012	O'Neill[F] 2009	Mapping Myara North [E]2019/20	Plots Myara North[E] 2019/20	MCPL[G] 2022
Olacaceae	*Olax benthamiana*				x	x	x	x		x		x	x				x
Onagraceae	* *Oenothera lindheimeri*					x											
Orchidaceae	*Caladenia denticulata*					x											
	Caladenia discoidea					x											
	Caladenia ferruginea					x											
	Caladenia flava				x	x									x	x	
	Caladenia flava subsp. *flava*					x	x			x							
	Caladenia hirta subsp. *hirta*					x											
	Caladenia latifolia					x				x				x			
	Caladenia longicauda subsp. *longicauda*					x											
	Caladenia marginata					x											
	Caladenia reptans														x		
	Caladenia reptans subsp. *reptans*				x	x	x								x		
	Caladenia speciosa	P4				x											
	Caladenia splendens					x											
	Caladenia sp.					x	x	x		x	x	x	x	x	x	x	x
	Corybas recurvus				x	x											
	Cryptandra sp.														x		
	Cryptostylis ovata													x			
	Cyanicula gemmata						x										
	Cyanicula sericea					x									x		

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Orchidaceae (cont.)	*Cyrtostylis huegelii*				x	x								x			
	Cyrtostylis robusta						x										
	Cyrtostylis sp.						x						x				
	* *Disa bracteata*					x	x										x
	Diuris brumalis					x											
	Diuris corymbosa					x								x			
	Diuris longifolia					x									x		
	Diuris micrantha	T	V	x													
	Diuris ostrina					x											
	Diuris porrifolia				x	x											
	Diuris purdiei	T	E	x		x											
	Diuris setacea					x											
	Diuris sp.									x				x	x		
	Drakaea elastica	T	E			x											
	Drakaea glyptodon					x											
	Drakaea livida					x											
	Drakaea sp.									x	x	x	x	x			
	Elythranthera brunonis					x		x		x	x				x	x	
	Elythranthera emarginata					x											
	Eriochilus dilatatus						x										x
	Eriochilus dilatatus subsp. *dilatatus*				x	x											
	Eriochilus helonomos				x	x											
	Leporella fimbriata					x											

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Orchidaceae	*Leptoceras menziesii*						x										
(cont.)	*Microtis alba*					x											
	Microtis media					x	x										
	Microtis media subsp. *media*					x											
	Microtis sp.						x										
	Paracaleana gracilicordata	P1			x	x											
	Paracaleana granitica	P1			x	x											
	Paracaleana hortiorum					x											
	Paracaleana nigrita					x											
	Pheladenia deformis						x								x		
	Praecoxanthus aphyllus				x	x											
	Prasophyllum brownii					x											
	Prasophyllum elatum					x											
	Prasophyllum fimbria					x											
	Prasophyllum macrostachyum					x											
	Prasophyllum parvifolium				x	x											
	Prasophyllum plumiforme					x											
	Prasophyllum sp.						x								x	x	
	Pterostylis angulata				x	x											
	Pterostylis aspera					x											
	Pterostylis atrosanguinea					x											
	Pterostylis barbata					x	x			x					x		
	Pterostylis dilatata					x											

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Orchidaceae	*Pterostylis glebosa*				x	x											
(cont.)	*Pterostylis recurva*				x	x	x			x				x	x		
	Pterostylis sanguinea					x				x							
	Pterostylis vittata					x	x			x				x			
	Pterostylis sp. Bloated snail orchid (W. Jackson BJ 486)				x	x											
	Pterostylis sp.						x	x		x	x		x	x	x	x	x
	Pyrorchis nigricans				x	x	x			x				x	x		
	Pyrorchis sp.							x			x		x	x			
	Spiculaea ciliata				x	x											
	Thelymitra antennifera					x									x		
	Thelymitra benthamiana					x											
	Thelymitra cornicina						x										
	Thelymitra crinita				x	x	x								x	x	
	Thelymitra flexuosa					x											
	Thelymitra frenchii					x											
	Thelymitra graminea					x											
	Thelymitra macrophylla					x	x	x			x						
	Thelymitra mucida					x											
	Thelymitra spiralis					x											
	Thelymitra uliginosa				x	x											
	Thelymitra vulgaris					x											

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Family	Species	Data source															
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Orchidaceae	*Thelymitra* sp.				x	x	x	x		x	x		x	x	x	x	
(cont.)	Orchidaceae sp.						x	x		x	x	x	x	x	x	x	x
Orobanchaceae	* *Bellardia trixago*				x	x	x										
	* *Bellardia viscosa*					x											
	* *Orobanche minor*					x		x		x							
	* *Parentucellia latifolia*					x	x								x		
Oxalidaceae	* *Oxalis corniculata*					x											
	* *Oxalis glabra*					x											
	* *Oxalis incarnata*					x											
	* *Oxalis pes-caprae*						x						x	x	x		
	Oxalis exilis					x											
	Oxalis perennans					x	x										
	* *Oxalis* sp.						x						x		x		
Papaveraceae	* *Fumaria capreolata*					x											
Parmeliaceae	*Xanthoparmelia subimitatrix*	P3															
	Xanthoparmelia sammyi	P1															
Philydraceae	*Philydrella drummondii*						x	x			x					x	
	Philydrella pygmaea					x											

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Philydraceae (cont.)	*Philydrella pygmaea* subsp. *pygmaea*					x	x										
Phrymaceae	*Glossostigma diandrum*					x											
Phyllanthaceae	*Lysiandra calycina*				x	x	x	x	x	x	x	x	x	x	x	x	x
	Poranthera huegelii				x	x								x			
	Poranthera microphylla					x	x	x			x				x	x	
Phytolaccaceae	* *Phytolacca octandra*												x				
Pinaceae	* *Pinus pinaster*									x					x		
	* *Pinus radiata*									x							
Pittosporaceae	*Billardiera floribunda*				x	x		x		x	x	x	x				
	Billardiera fraseri				x	x	x			x							
	Billardiera fusiformis					x	x	x	x	x	x	x	x	x	x	x	x
	Billardiera heterophylla							x		x		x			x		
	Billardiera variifolia					x		x	x		x	x	x	x			x
	Billardiera sp.						x	x	x			x	x		x	x	
	Cheiranthera preissiana					x											
	Marianthus coeruleopunctatus					x				x							
	Marianthus drummondianus				x	x	x	x	x	x	x	x	x	x	x		x
	Marianthus tenuis					x			x				x				

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Pittosporaceae	*Marianthus* sp.														x		
(cont.)	* *Pittosporum undulatum*					x											
Plantaginaceae	* *Callitriche stagnalis*					x											
	* *Misopates orontium*					x											
	Plantago hispida					x											
	?*Veronica* sp.						x										
Poaceae	* *Aira caryophyllea*					x	x	x			x	x	x			x	x
	* *Aira cupaniana*					x		x			x						
	* *Aira praecox*					x											
	Amphibromus nervosus					x											
	Amphipogon amphipogonoides					x	x	x	x	x	x	x	x	x	x	x	x
	Amphipogon debilis					x	x										
	Amphipogon laguroides					x	x								x		
	Amphipogon laguroides subsp. *havelii*					x											
	Amphipogon laguroides subsp. *laguroides*					x							x		x		x
	Amphipogon sp.						x	x			x						
	Aristida contorta					x											
	* *Aristida ramosa*					x											
	* *Avellinia festucoides*					x											
	* *Avena barbata*					x											
	# *Austrostipa tenuifolia*					x											

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Poaceae	*Amphipogon strictus*				x	x											
(cont.)	*Amphipogon turbinatus*					x		x				x					
	Austrostipa campylachne					x	x							x			
	Austrostipa compressa					x											
	Austrostipa flavescens					x		x			x						
	Austrostipa hemipogon				x	x											
	Austrostipa mollis				x	x										x	
	Austrostipa semibarbata					x											
	Austrostipa trichophylla					x											
	Austrostipa variabilis					x											
	Austrostipa sp.					x	x	x	x		x				x	x	
	* *Brachypodium distachyon*					x											
	* *Briza maxima*					x							x				
	* *Briza minor*					x	x								x	x	
	* *Bromus diandrus*					x											
	* *Bromus hordeaceus*					x											
	Bromus sp.						x										
	* *Chloris gayana*					x											
	* ?*Cynodon dactylon*						x										
	Dichelachne crinita					x		x			x						
	* *Ehrharta calycina*					x											
	* *Ehrharta longiflora*					x											
	* *Ehrharta* sp.					x				x							

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Poaceae (cont.)	* *Eleusine indica*					x											
	Eragrostis brownii					x											
	Eragrostis elongata					x											
	* *Glyceria declinata*					x											
	Hemarthria uncinata					x											
	Lachnagrostis plebeia					x											
	* *Lagurus ovatus*					x											
	* *Lolium rigidum*					x											
	* *Lolium* sp.						x										
	* *Melinis repens*					x											
	Microlaena stipoides					x											
	Microlaena stipoides var. *stipoides*					x	x										
	Neurachne alopecuroidea					x	x	x	x	x	x	x	x		x	x	x
	Neurachne sp.							x						x			
	* *Panicum miliaceum*					x											
	* *Paspalum dilatatum*					x											
	Paspalidium sp.?															x	
	* *Pentameris airoides*					x	x										x
	* *Pentameris airoides* subsp. *airoides*					x											
	* *Poa annua*					x											
	Poa drummondiana					x											
	Poa porphyroclados					x											
	Rytidosperma acerosum									x				x		x	

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Poaceae	*Rytidosperma caespitosum*					x	x	x	x	x	x	x	x	x	x	x	x
(cont.)	*Rytidosperma occidentale*					x							x				
	Rytidosperma pilosum					x											
	Rytidosperma setaceum					x											x
	Rytidosperma sp.						x	x		x	x	x		x		x	
	* *Setaria italica*					x											
	* *Setaria verticillata*					x											
	* *Sorghum halepense*					x											
	Spartochloa scirpoidea												x				
	Tetrarrhena laevis					x	x	x	x	x	x	x	x	x	x	x	x
	* *Vulpia bromoides*					x											
	* *Vulpia muralis*					x											
	* *Vulpia myuros*					x	x										
	* *Vulpia myuros* forma *myuros*					x											
	Vulpia sp.						x										
	Poaceae sp.						x	x		x	x	x	x	x	x		x
Podocarpaceae	*Podocarpus drouynianus*												x	x			
Polygalaceae	*Comesperma calymega*					x	x	x	x	x	x	x	x	x			x
	Comesperma ciliatum					x	x	x		x	x						
	Comesperma confertum												x				
	Comesperma flavum					x											

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Polygalaceae	*Comesperma polygaloides*						x	x			x						
(cont.)	*Comesperma scoparium*					x											
	Comesperma virgatum				x	x	x	x	x	x	x	x	x	x	x	x	x
	Comesperma volubile						x							x			
	Comesperma sp.													x	x	x	
Polygonaceae	*Muehlenbeckia adpressa*				x	x											
	* *Polygonum aviculare*					x											
	* *Rumex acetosella*				x	x											
	* *Rumex crispus*					x											
Potamogetonaceae	*Potamogeton ochreatus*					x											
Pottiaceae	*Barbula calycina*				x	x											
	Triquetrella paradoxa				x	x											
	Weissia controversa				x	x											
	Weissia rutilans					x											
Primulaceae	* *Lysimachia arvensis*					x	x	x		x	x		x		x	x	
	Samolus junceus						x						x				
	Samolus ?*repens* var. *floribundus*													x			

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Family	Species	Data source														
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Proteaceae	*Adenanthos barbiger*				x	x		x	x	x	x	x	x	x	x	x	x
	Adenanthos cygnorum													x			
	Adenanthos cygnorum subsp. *chamaephyton*	P3												x			
	Adenanthos meisneri					x											
	Adenanthos obovatus					x		x	x	x	x	x		x	x		x
	Banksia armata					x			x						x		
	Banksia armata var. *armata*				x	x				x			x	x			
	Banksia attenuata					x	x										
	Banksia bipinnatifida														x	x	x
	Banksia bipinnatifida subsp. *bipinnatifida*					x				x			x	x	x		
	Banksia dallanneyi				x	x											
	Banksia dallanneyi subsp. *dallanneyi*				x					x	x	x	x	x			
	Banksia dallanneyi subsp. *dallanneyi* var. *dallanneyi*					x	x	x	x						x	x	x
	Banksia dallanneyi subsp. *dallanneyi* var. *mellicula*					x											
	Banksia dallanneyi subsp. *sylvestris*				x	x				x			x				
	Banksia grandis				x	x	x	x	x	x	x	x	x	x	x	x	x
	Banksia kippistiana					x											
	Banksia littoralis				x	x	x	x	x	x	x	x	x	x	x	x	x
	Banksia nivea					x											
	Banksia polycephala				x	x											
	Banksia recurvistylis	P2			x	x											
	Banksia seminuda							x		x	x			x	x		
	Banksia sessilis				x			x	x	x	x	x	x	x	x	x	x

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Proteaceae	*Banksia sessilis* var. *sessilis*					x		x			x						
(cont.)	*Banksia sphaerocarpa*				x	x			x				x	x	x		x
	Banksia sphaerocarpa var. *sphaerocarpa*					x								x			
	Banksia squarrosa subsp. *squarrosa*				x	x		x		x	x	x	x	x	x		
	Banksia telmatiaea					x											
#	*Banksia undata*				x	x			x				x	x			
	Banksia undata var. *splendens*				x	x											
#	*Banksia undata* var. *undata*					x									x		
	Banksia sp.						x		x								
	Conospermum canaliculatum				x	x											
	Conospermum canaliculatum subsp. *canaliculatum*					x									x		
	Conospermum capitatum							x		x	x		x	x	x		
	Conospermum capitatum subsp. *glabratum*				x	x		x		x			x		x		
#	*Conospermum huegelii*				x	x									x		
	Conospermum scaposum	P3														x	
	Conospermum stoechadis				x	x									x		x
	Conospermum stoechadis subsp. *sclerophyllum*				x	x									x		x
	Conospermum stoechadis subsp. *stoechadis*				x	x											
	Conostephium pendulum					x		x			x						
	Grevillea bipinnatifida					x		x	x	x		x		x	x	x	x
	Grevillea bipinnatifida subsp. *bipinnatifida*				x	x	x			x			x	x			
	Grevillea centristigma				x	x				x							
	Grevillea crowleyae	P2				x											

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Proteaceae	*Grevillea diversifolia*	P3			X	x		x				x					
(cont.)	*Grevillea diversifolia* subsp. *diversifolia*					x	x	x		x	x		x		x		x
	Grevillea endlicheriana					x											x
	Grevillea flexuosa	T	V			x											
	Grevillea leptobotrys					x											
	Grevillea manglesii					x			x				x		x		x
	Grevillea ornithopoda	P2				x											
															x		
	Grevillea pilulifera					x				x							
	Grevillea pimeleoides	P4			x	x			x								
	Grevillea preissii												x				
	Grevillea pulchella				x	x		x	x	x		x	x	x		x	x
	Grevillea pulchella subsp. *ascendens*				x	x				x			x	x	x		
	Grevillea pulchella subsp. *pulchella*													x			
	Grevillea quercifolia				x	x		x			x		x	x	x		
	Grevillea synapheae subsp. *synapheae*					x											
	Grevillea trifida							x				x		x			
	Grevillea wilsonii				x	x		x	x	x	x	x	x	x	x	x	x
	Grevillea sp.													x	x	x	
	Hakea amplexicaulis					x		x	x	x	x	x	x	x	x		x
	Hakea candolleana				x	x											
	Hakea ceratophylla				x	x								x	x		
	Hakea cyclocarpa				x	x		x	x		x		x	x	x	x	x

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Proteaceae	*Hakea erinacea*				x	x							x				
(cont.)	*Hakea gilbertii*					x									x		
	Hakea incrassata					x	x	x	x	x		x	x	x	x		x
	Hakea lasianthoides					x											
	Hakea lissocarpha				x	x	x	x	x	x	x	x	x	x	x	x	x
	Hakea marginata					x	x			x				x	x		
	Hakea neospathulata					x											
	Hakea petiolaris								x								
	Hakea petiolaris subsp. *petiolaris*				x	x							x	x	x		
	Hakea prostrata					x	x	x			x	x	x	x	x	x	x
	Hakea ruscifolia				x	x	x	x	x	x	x	x	x	x	x	x	x
	Hakea stenocarpa					x		x		x	x		x	x	x		x
	Hakea sulcata					x									x		
	Hakea trifurcata				x	x		x		x	x		x	x	x		x
	Hakea undulata				x	x		x	x	x	x	x	x	x	x		x
	Hakea varia				x	x	x	x	x		x	x	x	x	x	x	x
	Hakea sp.														x		
	Isopogon asper					x											
	Isopogon autumnalis	P3				x											
	Isopogon crithmifolius				x	x											
	Isopogon dubius				x	x			x	x			x	x	x		x
	Isopogon sphaerocephalus					x			x	x			x	x			
	Isopogon teretifolius													x			

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Proteaceae (cont.)	*Isopogon* sp. Darling Range (F. Hort 1662)				x	x			x				x	x			x
	Lambertia multiflora var. *darlingensis*					x											
	Persoonia angustiflora				x	x	x		x					x	x		x
	Persoonia elliptica				x	x		x	x	x	x	x	x	x	x		x
	Persoonia longifolia				x	x	x	x	x	x	x	x	x	x	x	x	x
	Persoonia quinquenervis					x											
	Persoonia saccata					x									x		
	Petrophile biloba					x				x			x				
	Petrophile brevifolia					x											
	Petrophile filifolia subsp. *laxa*	P3				x											
	Petrophile heterophylla							x			x						
	Petrophile linearis					x				x			x				
	Petrophile macrostachya					x									x	x	
	Petrophile seminuda					x											
	Petrophile serruriae				x	x			x	x			x	x	x		x
	Petrophile squamata				x	x									x		
	Petrophile squamata subsp. northern (J. Monks 40)				x	x											
	Petrophile squamata subsp. *squamata*														x		
	Petrophile striata				x	x	x		x	x			x	x	x		x
	Petrophile sp.								x						x		
	Stirlingia latifolia					x							x		x	x	
	Stirlingia simplex					x			x						x		
	Synaphea acutiloba					x											

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Proteaceae	*Synaphea cuneata*					x									x		
(cont.)	*Synaphea damopsis*				x	x							x	x			
	Synaphea decorticans				x	x											
	Synaphea gracillima				x	x	x			x			x		x		
	Synaphea odocoileops	P1				x											
	Synaphea pandurata	P3				x											
	Synaphea petiolaris				x	x		x						x	x		x
	Synaphea petiolaris subsp. *petiolaris*					x					x		x		x		
	Synaphea pinnata					x											
	Synaphea spinulosa									x							
	Synaphea sp. Fairbridge Farm (D. Papenfus 696)	T	CE			x											
	Synaphea sp. Pinjarra Plain (A.S. George 17182)	T	E			x											
	Synaphea sp. Serpentine (G.R. Brand 103)	T	CE			x											
	Synaphea sp.								x					x	x	x	x
	Xylomelum occidentale					x		x		x	x		x	x	x	x	x
	Proteaceae sp.														x		
Pteridaceae	*Adiantum aethiopicum*										x				x		
	Cheilanthes austrotenuifolia					x				x			x		x		
	Cheilanthes distans					x											
	Cheilanthes sieberi														x		
	Cheilanthes sieberi subsp. *sieberi*					x							x				

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Racopilaceae	*Racopilum cuspidigerum* var. *convolutaceum*				x	x											
Ranunculaceae	*Clematis pubescens*				x	x	x	x	x	x	x	x	x	x	x	x	x
	Ranunculus colonorum					x	x	x	x	x	x			x	x		
Restionaceae	*Alexgeorgea nitens*							x		x	x						
	Chaetanthus aristatus					x											
	Chaetanthus leptocarpoides														x		
	Chaetanthus tenellus														x		
	Chordifex ?laxus														x		
	Cytogonidium leptocarpoides					x											
	Desmocladus asper					x											
	Desmocladus castaneus					x											
	Desmocladus fasciculatus				x	x	x	x	x	x	x	x	x	x	x	x	x
	Desmocladus flexuosus				x	x	x	x	x	x	x	x	x	x	x	x	x
	Desmocladus lateriflorus					x											
	Desmocladus sp.								x								
	Dielsia stenostachya					x											
	Hypolaena exsulca				x	x	x	x		x	x		x	x	x	x	x
	Lepidobolus preissianus				x	x	x							x	x		
	Lepidobolus preissianus subsp. *preissianus*					x								x	x	x	
	Leptocarpus canus						x								x		x
	Leptocarpus coangustatus						x	x			x			x	x		

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Restionaceae	*Leptocarpus decipiens*				x	x	x										
(cont.)	*Leptocarpus kraussii*					x											
	Leptocarpus roycei				x												
	Leptocarpus scariosus						x	x			x	x			x		
	Leptocarpus sp.						x										
	Lepyrodia curvescens	P2			x												
	Lepyrodia glauca				x	x	x										
	Lepyrodia heleocharoides	P3				x											
	Lepyrodia macra					x									x		
	Lepyrodia muirii					x											
	Lepyrodia riparia				x	x									x		
	Loxocarya cinerea				x	x	x	x	x	x	x	x	x	x	x	x	x
	Loxocarya striata								x				x				
	Sporadanthus rivularis							x		x	x	x					
	Tremulina tremula		x		x	x											
	Restionaceae sp.						x	x			x	x			x	x	
Rhamnaceae	*Cryptandra arbutiflora*					x											
	Cryptandra arbutiflora var. *arbutiflora*				x	x	x						x	x	x	x	
	Cryptandra arbutiflora var. *tubulosa*														x		
	Cryptandra mutila														x		
	Cryptandra myriantha														x		
	Cryptandra nutans					x											

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Rhamnaceae	*Cryptandra* sp.						x								x		
(cont.)	*Stenanthemum coronatum*				x	x											
	Stenanthemum emarginatum					x											
	Stenanthemum nanum					x									x		
	Trymalium ledifolium				x	x		x	x	x	x	x	x	x	x	x	x
	Trymalium ledifolium var. *ledifolium*				x	x	x										
	Trymalium ledifolium var. *rosmarinifolium*				x	x				x							
	Trymalium odoratissimum							x			x			x	x	x	x
	Trymalium odoratissimum subsp. *odoratissimum*				x	x	x	x	x	x	x	x	x	x			
Rosaceae	*Acaena echinata*				x	x								x	x		
	* *Prunus cerasifera*					x											
	* *Rubus anglocandicans*					x											
	* *Rubus laudatus*					x											
	* *Rubus loganobaccus*					x											
	* *Rubus ulmifolius*					x											
	* *Rubus ulmifolius* var. *ulmifolius*					x											
Rubiaceae	* *Galium divaricatum*					x											
	* *Galium murale*					x											
	Galium sp.														x		
	Opercularia apiciflora				x	x	x	x		x	x			x	x	x	
	Opercularia echinocephala				x	x	x	x	x	x	x	x	x	x	x	x	x

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Rubiaceae	*Opercularia hispidula*					x	x	x		x	x	x	x	x	x	x	
(cont.)	*Opercularia vaginata*					x	x			x			x		x		
	Opercularia sp.						x			x					x		
Ruppiaceae	*Ruppia polycarpa*					x											
Rutaceae	*Asterolasia pallida*				x	x			x	x			x	x	x		x
	Boronia crenulata				x	x		x	x	x	x	x	x	x	x	x	x
	Boronia crenulata subsp. *crenulata* var. *crenulata*					x		x		x		x					
	Boronia crenulata subsp. *pubescens*													x	x		
	Boronia crenulata subsp. *viminea*					x	x	x		x	x	x	x	x		x	
	Boronia fastigiata				x	x	x	x	x	x	x	x	x	x	x	x	x
	Boronia molloyae					x		x	x	x	x	x	x	x	x		x
	Boronia ovata													x			
	Boronia scabra subsp. *scabra*					x									x		
	Boronia spathulata							x			x						
	Boronia sp.						x	x			x				x		x
	Cyanothamnus ramosus					x											
	Cyanothamnus ramosus subsp. *anethifolius*														x		
	Cyanothamnus ramosus subsp. *ramosus*					x											
	Cyanothamnus tenuis	P4				x											
	Diplolaena microcephala												x				

APPENDIX B: SUMMARY OF POTENTIAL AND RECORDED PLANT SPECIES RECORDED IN MYARA AND O'NEILL, 2006 TO 2022

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Family		Species	Data source															
			SCC	FCC	EPBC[A]	NatureMap[B] 10km	NatureMap[C] 20km	MCPL[D] 2006	MCPL[D] 2011	MCPL[D] 2019	MCPL[E] 2008	MCPL[E] 2009	MCPL[E] 2010	MCPL[E] 2012	O'Neill[F] 2009	Mapping Myara North[E] 2019/20	Plots Myara North[E] 2019/20	MCPL[G] 2022
Rutaceae		*Philotheca nodiflora* subsp. *latericola*					x											
(cont.)		*Philotheca spicata*				x	x	x	x	x	x	x	x	x	x	x	x	x
		Rutaceae sp.								x								
Santalaceae		*Exocarpos sparteus*												x				
		Leptomeria cunninghamii				x	x	x	x	x	x	x	x	x	x	x	x	x
		Santalum acuminatum														x		
Sapindaceae		*Diplopeltis huegelii* subsp. *huegelii*					x											
		Diplopeltis huegelii subsp. *lehmannii*					x											
		Dodonaea ceratocarpa					x			x	x			x		x		
		Dodonaea pinifolia					x											
		Dodonaea viscosa subsp. *angustissima*												x				
Scrophulariaceae	*	*Phyllopodium cordatum*					x											
	*	*Selago corymbosa*																x
	*	*Verbascum virgatum*					x							x				
Sematophyllaceae		*Sematophyllum homomallum*				x	x											
Solanaceae		*Anthocercis gracilis*	T	V	x		x											
	*	*Datura ferox*					x											
	#	*Solanum hoplopetalum*				x												

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Family	Species	Data source														
		SCC	FCC	EPBC[A]	NatureMap[B] 10km	NatureMap[C] 20km	MCPL[D] 2006	MCPL[D] 2011	MCPL[D] 2019	MCPL[E] 2008	MCPL[E] 2009	MCPL[E] 2010	MCPL[E] 2012	O'Neill[F] 2009	Mapping Myara North [E]2019/20	Plots Myara North[E] 2019/20	MCPL[G] 2022
Solanaceae	* *Solanum nigrum*														x		
(cont.)	* *Sonchus oleraceus*					x	x	x				x				x	
Stylidiaceae	*Levenhookia dubia*						x										
	Levenhookia preissii	P1								x							
	Levenhookia pusilla					x	x	x		x	x	x	x		x	x	x
	Levenhookia stipitata					x	x			x			x				x
	Stylidium adpressum					x											
	Stylidium affine														x		
	Stylidium amoenum				x	x	x	x	x	x	x	x	x	x	x	x	x
	Stylidium amoenum var. *amoenum*				x	x											
	Stylidium amoenum var. *caulescens*				x	x											
	Stylidium androsaceum					x		x			x				x		
	Stylidium breviscapum					x											
	Stylidium brunonianum				x	x	x	x		x	x		x	x			
	Stylidium bulbiferum					x		x		x	x	x	x	x		x	x
	Stylidium calcaratum					x	x	x		x	x				x	x	x
	Stylidium carnosum					x											
	Stylidium ciliatum				x	x	x		x				x				x
	Stylidium crassifolium					x	x	x			x						
	Stylidium despectum					x											
	Stylidium dichotomum					x		x	x	x		x		x			
	Stylidium diuroides				x	x								x	x		

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Family	Species	Data source														
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Stylidiaceae	*Stylidium diuroides* subsp. *diuroides*				x	x							x	x			x
(cont.)	*Stylidium divaricatum*					x											
	Stylidium diversifolium					x											
	Stylidium ecorne					x											
	Stylidium emarginatum					x	x								x		
	Stylidium eriopodum					x											x
	Stylidium guttatum				x	x	x										
	Stylidium hispidum				x	x									x	x	
	Stylidium ireneae	P4				x	x	x			x						
	Stylidium junceum					x		x		x	x		x	x	x		x
	Stylidium lateriticola				x	x							x		x	x	
	Stylidium lineatum				x	x		x			x				x		
	Stylidium longitubum	P4					x	x			x						
	Stylidium paulineae					x											
	Stylidium perpusillum					x											
	Stylidium petiolare					x	x										
	Stylidium piliferum				x	x		x	x	x	x	x	x	x	x	x	x
	Stylidium preissii													x			
	Stylidium pulchellum					x	x										
	Stylidium pycnostachyum					x	x			x							
	Stylidium recurvum				x	x											
	Stylidium repens					x		x	x	x	x		x	x	x		
	Stylidium scariosum				x	x											x

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Family	Species	Data source														
		SCC	FCC	EPBC[A]	NatureMap[B] 10km	NatureMap[C] 20km	MCPL[D] 2006	MCPL[D] 2011	MCPL[D] 2019	MCPL[E] 2008	MCPL[E] 2009	MCPL[E] 2010	MCPL[E] 2012	O'Neill[F] 2009	Mapping Myara North [E]2019/20	Plots Myara North[E] 2019/20	MCPL[G] 2022
Stylidiaceae	*Stylidium schoenoides*					x				x					x	x	x
(cont.)	*Stylidium spathulatum*						x										
	Stylidium tenue subsp. *majusculum*				x	x											
	Stylidium tenue subsp. *tenue*				x	x											
	Stylidium thesioides				x	x	x								x		
	Stylidium utricularioides				x	x	x										
	Stylidium xanthellum					x											
	Stylidium sp. Boulder Rock (A.H. Burbidge 2536)				x	x											
	Stylidium sp.				x	x	x	x	x	x	x	x		x	x		x
Thuidiaceae	*Thuidium sparsum* var. *hastatum*					x											
Thymelaeaceae	*Pimelea angustifolia*													x			x
	Pimelea argentea					x											
	Pimelea brevistyla subsp. *brevistyla*				x	x								x			
	Pimelea ciliata							x	x	x	x	x		x	x	x	x
	Pimelea ciliata subsp. *ciliata*				x	x	x	x			x		x				
	Pimelea imbricata					x									x		
	Pimelea imbricata var. *piligera*					x	x			x							
	Pimelea lanata							x		x	x						
	Pimelea ?lehmanniana													x			
	Pimelea lehmanniana subsp. *nervosa*				x	x							x		x		
	Pimelea preissii				x	x											

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Family	Species	Data source															
		SCC	FCC	EPBC[A]	NatureMap[B] 10km	NatureMap[C] 20km	MCPL[D] 2006	MCPL[D] 2011	MCPL[D] 2019	MCPL[E] 2008	MCPL[E] 2009	MCPL[E] 2010	MCPL[E] 2012	O'Neill[F] 2009	Mapping Myara North [E]2019/20	Plots Myara North[E] 2019/20	MCPL[G] 2022
Thymelaeaceae	*Pimelea rara*	P4			x	x											
(cont.)	*Pimelea spectabilis*					x		x		x	x			x	x	x	x
	Pimelea suaveolens						x	x		x	x	x		x	x	x	x
	Pimelea suaveolens subsp. *suaveolens*				x	x		x		x	x		x	x			
	Pimelea sylvestris				x	x											
	Pimelea sp.						x	x	x	x	x				x	x	x
Typhaceae	*Typha* sp.												x				
Verbenaceae	*Verbenaceae* sp.						x										
Violaceae	*Hybanthus calycinus*					x		x			x						
	Hybanthus debilissimus					x	x	x		x	x	x			x		
	Hybanthus floribundus				x	x		x							x	x	
	Hybanthus floribundus subsp. *floribundus*				x	x	x					x	x			x	
Xanthorrhoeaceae	*Xanthorrhoea acanthostachya*					x											
	Xanthorrhoea gracilis				x	x	x	x	x	x	x	x	x	x	x	x	x
	Xanthorrhoea preissii				x	x	x	x	x	x	x	x	x		x	x	x
Zamiaceae	*Macrozamia riedlei*				x	x	x	x	x	x	x	x	x	x	x	x	x
Zygophyllaceae	* *Tribulus terrestris*					x											

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE MYARA EAST 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. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Anthocercis gracilis	Solanaceae	T	Vulnerable	Habit: Erect, spindly shrub, to 0.6 (-1) m high. Flower colour: yellow-green Flowering period (indicated in green): J F M A M J J A **S** **O** N D Soils: Sandy or loamy soils. Granite outcrops. IBRA Distribution: AVW, JAF Florabase records: 29	Low
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
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: 2	Low

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
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
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
Andersonia sp. Saxatilis (F. & J. Hort 3324)	Ericaceae	P1	-	Habit: Single-stemmed shrub to 0.6 m high. Flower colour: white-pink Flowering period (indicated in green): **J** F M A M J J A **S O** N D Soils: Dry, brown loam, clay over granite. Slope, outcrops, granite and laterite. IBRA Distribution: JAF Florabase records: 6	High

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Anthotium sp. Darling Range (F. Hort & B. Hort 2431)	Goodeniaceae	P1	-	Habit: Prostrate, spreading perennial, herb, to 0.05 m high. Flower colour: pink/mauve/purple/blue Flowering period (indicated in green): J F M A M J J A S O **N** **D** Soils: Yellow, grey or brown clayey sand, loam. Slopes, low plains, drainage lines of swamp flats. IBRA Distribution: JAF Florabase records: 16	Low
Calytrix simplex subsp. *simplex*	Myrtaceae	P1	-	Habit: Shrub, ca 0.2 m high. Flower colour: purple Flowering period (indicated in green): J F M A M J J A S **O** **N** D Soils: Grey clay loam soil, red-brown gravelly loam. Flats and slopes on laterite, swamp. IBRA Distribution: JAF, SWA Florabase records: 5	Low
Darwinia hortiorum	Myrtaceae	P1	-	Habit: Erect to spreading, densely branched shrub to 0.7 m high and 0.8 m wide. Flower colour: reddish-brown & green & yellow-red Flowering period (indicated in green): J F M A M J J A **S** **O** **N** **D** Soils: Shallow granitic soils, loam or loam/clay associated with laterite. Granite outcrops and drainage lines to granite outcrops. IBRA Distribution: JAF Florabase records: 8	Moderate

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Drosera oreopodion	Droseraceae	P1		Habit: Fibrous-rooted, rosetted perennial, herb, to 0.035 m high, to 0.015 m wide. Flower colour: White Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: Clayey sand sometimes mixed with lateritic pebbles. IBRA Distribution: JAF, SWA Florabase records: 6	Low
Drosera paleacea	Droseraceae	P1		Habit: Fibrous-rooted, rosetted perennial, herb, to 0.03 m high, to 0.015 m wide. Flower colour: white-cream Flowering period (indicated in green): **J** F M A M J J A **S O N D** Soils: White sand, sandy clay. IBRA Distribution: AVW, WAR Florabase records: 16	Low
Hemigenia rigida	Lamiaceae	P1	- 4	Habit: Upright or spreading shrub, 0.1-0.6 (-1) m high. Flower colour: blue-purple/violet Flowering period (indicated in green): **J** F M A M J J **A S O N D** Soils: Sandy soils, lateritic gravelly soils. Hillslopes, granite outcrops IBRA Distribution: AVW Florabase records: 4	Low

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Hibbertia hortiorum	Dilleniaceae	P1		Habit: Prostrate shrub Flower colour: Yellow Flowering period (indicated in green): **J** F M A M J J **A S O N D** Soils: Lateritic yellowish sandy loam. IBRA Distribution: JAF Florabase records: 12	Moderate
Hibbertia polyancistra	Dilleniaceae	P1	-	Habit: Erect shrub 0.3-0.45 (-0.6) m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O **N D** Soils: Shallow soil over granite. IBRA Distribution: JAF Florabase records: 8	Low
Levenhookia preissii	Stylidiaceae	P1	-	Habit: Annual (ephemeral), herb, 0.03-0.17 m high. Flower colour: pink-red Flowering period (indicated in green): J F M A M J J A **S O N D** Soils: Grey or black, peaty sand. Swamps. IBRA Distribution: SWA Florabase records: 14	Low
Paracaleana gracilicordata	Orchidaceae	P1	-	Habit: Perennial, herb, to 0.07 m high. Flower colour: green-yellow-purple Flowering period (indicated in green): J F M A M J J A S **O N** D Soils: Growing on moss mats, granite. Outcrops. IBRA Distribution: JAF Florabase records: 8	High

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Paracaleana granitica	Orchidaceae	P1	-	Habit: Perennial, herb, to 0.07 m high. Flower colour: green-purple Flowering period (indicated in green): J F M A M J J A S **O N D** Soils: Growing on moss mats, granite. Outcrops. IBRA Distribution: JAF Florabase records: 7	High
Philydrella pygmaea subsp. *minima*	Philydraceae	P1		Habit: Bulbaceous, perennial, 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: Damp sites. IBRA Distribution: WAR Florabase records: 1	Low
Senecio gilbertii	Asteraceae	P1	-	Habit: Erect, slender perennial, 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: Peaty sand. Swamps, slopes IBRA Distribution: AVW, JAF Florabase records: 10	Low
Synaphea odocoileops	Proteaceae	P1	-	Habit: Tufted, compact shrub, 0.2-0.5 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O N D Soils: Brown-orange loam & sandy clay, granite. Swamps, winter-wet areas. IBRA Distribution: SWA Florabase records: 22	Low

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Banksia recurvistylis	Proteaceae	P2	-	Habit: Non-lignotuberous shrub to c. 2 m high and 3 m wide. Flower colour: pale yellow Flowering period (indicated in green): J F M A M J J A S O **N** **D** Soils: Shallow, lateritic soils associated with granite outcrops. IBRA Distribution: JAF Florabase records: 7	High
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	Low
Calectasia grandiflora	Dasypogonaceae	P2		Habit: Rhizomatous, perennial, herb (or undershrub), to 0.65 m high, without stilt roots. Flower colour: blue/purple Flowering period (indicated in green): J F M A M **J** **J** **A** **S** **O** **N** D Soils: White, grey or yellow sand, sandy clay, gravel, laterite, granite. Swampy areas, rock outcrops, flats, slopes, ridges. IBRA Distribution: JAF, SWA Florabase records: 12	Low

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE MYARA EAST 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. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Grevillea crowleyae	Proteaceae	P2	-	Habit: Dense & spreading shrub, 0.5-1.5 m high. Flower colour: - Flowering period (indicated in green): J F M A M J J **A S O N** D Soils: Loam. IBRA Distribution: JAF Florabase records: 9	Low
Grevillea manglesii subsp. *ornithopoda*	Proteaceae	P2	-	Habit: Spreading, virgate shrub, 1-3 (-5) m high, up to 3 m wide. Flower colour: - Flowering period (indicated in green): J F M A M J J A **S O N** D Soils: Loam, loam over clay, sand, clay. Edge of river bank and creek, dunes IBRA Distribution: JAF, SWA Florabase records: 17	Low
Johnsonia pubescens subsp. *cygnorum*	Hemerocallidaceae	P2	-	Habit: Tufted, perennial, herb, 0.15-0.25 m high. Flower colour: white-green Flowering period (indicated in green): J F M A M J J A **S** O N D Soils: Grey-white-yellow sand. Flats, seasonally-wet sites. IBRA Distribution: SWA Florabase records: 12	Low

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE MYARA EAST 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. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Lepyrodia 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: light-brown to mauve 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: SWA Florabase records: 20	Low
Millotia tenuifolia var. *laevis*	Asteraceae	P2	-	Habit: Ascending to erect annual, herb, 0.02-0.1 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: Granite or laterite soils. IBRA Distribution: AVW, JAF, SWA Florabase records: 13	Low
Stylidium sp. Boulder Rock (A.H. Burbidge 2536)	Stylidiaceae	P2		Habit: Prostrate, mat-forming perennial, herb. Flower colour: white Flowering period (indicated in green): J F M A M J J A S O **N** D Soils: Granitic soils. Granite rocks. IBRA Distribution: JAF Florabase records: 41	Moderate
Tetratheca phoenix	Elaeocarpaceae	P2	-	Habit: Few-branched shrub (subshrub), to 0.25 m high. Flower colour: dark pink-magenta Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: Brown gravelly loam over granite. Mid to Upper slopes, near granite outcrops. IBRA Distribution: JAF Florabase records: 10	Moderate

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE MYARA EAST AREA

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Acacia drummondii subsp. *affinis*	Fabaceae	P3	-	Habit: Erect shrub, 0.3-1 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J **J** **A** S O N D Soils: Lateritic gravelly soils. IBRA Distribution: AVW, JAF, SWA Florabase records: 37	Low
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
Acacia oncinophylla subsp. *oncinophylla*	Fabaceae	P3	-	Habit: Shrub, 0.9-2.5 m high, 'minni-ritchi' bark, phyllodes mostly 8-13 cm long, 1-2 mm wide. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A** **S** **O** N D Soils: Granitic soils IBRA Distribution: AVW, JAF, SWA Florabase records: 42	Low

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE MYARA EAST 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. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Adenanthos cygnorum subsp. chamaephyton	Proteaceae	P3		Habit: Prostrate, mat-forming, non-lignotuberous shrub, to 0.3 m high. Flower colour: white-cream-pink-green/green Flowering period (indicated in green): **J** F M A M **J** **J** **A** **S** **O** **N** **D** Soils: Grey sand, lateritic gravel. IBRA Distribution: AVW, JAF, SWA Florabase records: 21	Low
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	High
Byblis gigantea	Byblidaceae	P3	-	Habit: Small, branched perennial, herb (or sub shrub), to 0.45 m high. Flower colour: pink-purple/white Flowering period (indicated in green): **J** F M A M J J A **S** **O** **N** **D** Soils: Sandy-peat swamps. Seasonally wet areas. IBRA Distribution: JAF, SWA Florabase records: 40	Low

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE MYARA EAST 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. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Conospermum scaposum	Proteaceae	P3		Habit: Erect shrub, 0.2-0.45(-0.75) m high. Flower colour: blue Flowering period (indicated in green): **J F** M A M J J A S **O N D** Soils: White-grey sand, sandy clay. Low swampy areas, road verges. IBRA Distribution: AVW, GES, JAF, SWA Florabase records: 46	Low
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	Low
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	Moderate

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE MYARA EAST AREA

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Halgania corymbosa	Boraginaceae	P3	-	Habit: Erect shrub, 0.35-1 m high. Flower colour: blue-purple Flowering period (indicated in green): J F M A M J J **A S O N** D Soils: Gravelly soils, soils over granite. IBRA Distribution: JAF, SWA Florabase records: 18	Low
Isopogon autumnalis	Proteaceae	P3	-	Habit: Shrub 0.3-1 m high, commonly 0.5-1 m wide. Flower colour: pale yellow Flowering period (indicated in green): **J F M A M** J J A S O N D Soils: Sandy soils. IBRA Distribution: GES, JAF, SWA Florabase records: 59	Low
Lasiopetalum glutinosum subsp. *glutinosum*	Malvaceae	P3	-	Habit: Shrub to 0.8 m high. Flower colour: pink-purple Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: Lateritic gravel and clay, clay loam, sandy clay over granite. Slopes, granite outcrops. IBRA Distribution: AVW, JAF, SWA Florabase records: 48	Low

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE MYARA EAST AREA

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Lepyrodia heleocharoides	Restionaceae	P3	-	Habit: Rhizomatous, slender, tufted perennial, herb (sedge-like), 0.15-0.25 m high. Flower colour: - Flowering period (indicated in green): J F M A M J J A S O N **D** Soils: Moist peaty sand. Dry or seasonally inundated heath or woodland, swamps. IBRA Distribution: JAF, SWA Florabase records: 20	Low
Meionectes tenuifolia	Haloragaceae	P3	-	Habit: Annual semi-aquatic herb, to 0.35 m high. Flower colour: orange-red-brown, green Flowering period (indicated in green): J F M A M J J A **S O N D** Soils: Grey sand or grey-brown clay, shallow soils. Seasonally inundated flat, edge of swamp. IBRA Distribution: JAF, SWA Florabase records: 24	Low
Petrophile filifolia subsp. *laxa*	Proteaceae	P3	-	Habit: Erect, spreading shrub, to 0.75 m high. Flower colour: cream Flowering period (indicated in green): **J** F M A M J J A S O **N D** Soils: White gritty sand, brown, red, yellow, white or grey sand, brown-yellow sandy clay. Winter-wet sites, flats, slopes, swamps, drainage lines. IBRA Distribution: JAF Florabase records: 18	Moderate

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE MYARA EAST AREA

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Pithocarpa corymbulosa	Asteraceae	P3	-	Habit: Erect to scrambling perennial, herb, 00.5-1 m high. Flower colour: white Flowering period (indicated in green): **J F M A** M J J A S O N D Soils: Gravelly or sandy loam. Amongst granite outcrops. IBRA Distribution: GES, JAF, SWA Florabase records: 22	Low
Stackhousia sp. Red-blotched corolla (A. Markey 911)	Celastraceae	P3	-	Habit: Erect herb or shrub, approximately 0.2 m high. Flower colour: cream-yellow Flowering period (indicated in green): J F M A M J J A **S O N** D Soils: Brown loamy sand, clayey sand over laterite, white sandy clay over granite, grey clay. Slopes. IBRA Distribution: AVW, GES, JAF Florabase records: 9	Low
Synaphea pandurata	Proteaceae	P3	-	Habit: Clumped shrub (subshrub), 0.2-0.55 m high. Flower colour: yellow Flowering period (indicated in green): J F M **A** M **J** J A **S O** N **D** Soils: Yellow-grey, yellow-brown, yellow-red sands and sandy loams, dark brown loam, laterite gravel, granite. In undulating areas. IBRA Distribution: JAF Florabase records: 23	Moderate

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE MYARA EAST AREA

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Thysanotus anceps	Asparagaceae	P3	-	Habit: Rhizomatous, leafless perennial, herb, to 0.4 m high. Flower colour: purple Flowering period (indicated in green): J F M A M J J A S **O N D** Soils: White or grey sand, lateritic gravel, laterite. IBRA Distribution: GES, JAF, SWA Florabase records: 17	Low
Acacia cuneifolia	Fabaceae	P4	-	Habit: Erect or straggly shrub, 1-3 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J **J A S O** N D Soils: Sand, clay or loam over granite. Granite outcrops & hills, rocky watercourses. IBRA Distribution: AVW, JAF Florabase records: 41	Low
Caladenia speciosa	Orchidaceae	P4	-	Habit: Tuberous, perennial, herb, 0.35-0.6 m high. Flower colour: white-pink Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: White, grey or black sand. IBRA Distribution: JAF, SWA Florabase records: 59	Low
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

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
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
Grevillea pimeleoides	Proteaceae	P4	-	Habit: Non-lignotuberous shrub, 0.4-2.4 m high. Flower colour: yellow-orange Flowering period (indicated in green): J F M A **M J J A S O N** D Soils: Gravelly soils over granite. Rocky hillsides. IBRA Distribution: JAF Florabase records: 36	High
Hemigenia platyphylla	Lamiaceae	P4	-	Habit: Spreading shrub, 0.2-1.5 m high. Flower colour: blue-purple Flowering period (indicated in green): J F M A M J J A **S O N** D Soils: Sandy & loamy soils. Granite rocks, slopes. IBRA Distribution: AVW, ESP, JAF, MAL Florabase records: 21	Moderate

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE MYARA EAST 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	Moderate
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
Pimelea rara	Thymelaeaceae	P4	-	Habit: Shrub, 0.2-0.35 m high. Flower colour: white Flowering period (indicated in green): **J** F M A M J J A S O N **D** Soils: Lateritic soils. IBRA Distribution: JAF Florabase records: 52	High
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

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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
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
Goodenia verreauxii	Goodeniaceae	P4	-	Habit: Perennial, herb, to 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: White/grey or yellow sand. Flats. IBRA Distribution: AVW, JAF Florabase records: 44	Low

APPENDIX D: SUMMARY OF PLANT SPECIES BY SITE-VEGETATION TYPES IN MYARA EAST SURVEY AREA

* denotes introduced soecies

	Site-Vegetation Types																	
Species	**A**	**AC**	**CW**	**D**	**DA**	**DG**	**E**	**G**	**P**	**PS**	**PW**	**R**	**S**	**SP**	**ST**	**SW**	**TS**	**W**
Acacia alata	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	
Acacia applanata											x							
Acacia browniana													x	x	x			
Acacia divergens						x												
Acacia drummondii subsp. *candolleana*								x	x	x			x	x				
Acacia drummondii subsp. *drummondii*				x						x			x			x		
Acacia extensa	x	x	x	x	x					x	x	x	x	x				
Acacia incurva			x	x	x													
Acacia lateriticola				x		x			x				x			x		
Acacia nervosa										x								
Acacia nervosa											x							
Acacia pulchella	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	
Acacia saligna													x					
Acacia urophylla				x				x	x	x	x	x	x	x	x		x	
Acacia urophylla				x					x	x	x		x	x	x	x		
Acacia varia												x						
Acacia willdenowiana				x														
Acacia alata	x		x		x								x					
Adenanthos barbiger		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Adenanthos obovatus				x							x							
Agrostocrinum hirsutum			x															
Agrostocrinum scabrum									x	x	x		x					
* *Aira caryophyllea*											x							
Allocasuarina fraseriana				x	x	x	x	x	x	x	x	x	x	x		x		
Allocasuarina humilis									x		x		x					
Allocasuarina fraseriana						x					x		x					
Amphipogon amphipogonoides				x	x				x		x		x			x		
Amphipogon laguroides subsp. *laguroides*				x														
Anarthriaceae sp.					x													
Andersonia lehmanniana	x			x														
Anigozanthos manglesii										x								
Anigozanthos manglesii											x							
Astartea scoparia	x	x	x		x	x			x		x			x	x			
* Asteraceae sp.				x					x		x		x					
Asteraceae sp.										x								
Asterolasia pallida								x										
Babingtonia camphorosmae	x	x	x	x	x	x	x	x	x		x	x				x		

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* denotes introduced soecies

	Site-Vegetation Types																	
Species	**A**	**AC**	**CW**	**D**	**DA**	**DG**	**E**	**G**	**P**	**PS**	**PW**	**R**	**S**	**SP**	**ST**	**SW**	**TS**	**W**
Banksia bipinnatifida				x	x											x		
Banksia dallanneyi subsp. dallanneyi	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Banksia grandis	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	
Banksia littoralis	x	x	x	x	x	x						x					x	
Banksia seminuda									x									
Banksia seminuda											x							
Banksia sessilis				x		x			x	x	x		x			x		
Banksia sphaerocarpa									x	x	x							
Billardiera fusiformis										x			x			x		
Billardiera variifolia				x		x				x								
Boronia fastigiata	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Boronia molloyae													x					
Boronia sp.	x																	
Boronia ?crenulata				x									x					
Borya sphaerocephala				x		x		x										
Bossiaea angustifolia													x					
Bossiaea aquifolium	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
Bossiaea eriocarpa				x					x		x	x	x				x	
Bossiaea ornata				x	x	x	x	x	x	x	x	x	x	x	x	x		x
Bossiaea pulchella												x						
Bossiaea ornata				x			x	x	x	x	x	x	x	x	x	x		
Caladenia sp.													x					
Callistachys lanceolata	x																	
Calytrix angulata								x										
Calytrix flavescens	x	x		x		x							x		x			
Calytrix sp.									x									
Cassytha sp.				x		x			x			x	x					
Chamaescilla corymbosa										x								
Chorizema cordatum		x								x					x	x		
Clematis pubescens				x	x			x		x	x				x	x	x	
Comesperma calymega											x							
Comesperma virgatum									x		x	x	x		x			
Conospermum stoechadis								x										
Conospermum stoechadis ? subsp. *sclerophyllum*											x							
Conostylis pusilla	x	x		x	x	x			x		x		x	x		x		
Conostylis pusilla				x			x		x	x	x					x		
Conostylis serrulata				x			x	x	x	x	x		x	x	x			

APPENDIX D: SUMMARY OF PLANT SPECIES BY SITE-VEGETATION TYPES IN MYARA EAST SURVEY AREA

* denotes introduced soecies

	Site-Vegetation Types																	
Species	**A**	**AC**	**CW**	**D**	**DA**	**DG**	**E**	**G**	**P**	**PS**	**PW**	**R**	**S**	**SP**	**ST**	**SW**	**TS**	**W**
Conostylis setigera	x			x		x		x	x	x	x	x	x	x	x	x		
Conostylis setosa				x		x	x	x	x	x	x	x	x	x		x		
Conostylis sp.				x														
Corymbia calophylla	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Corymbia calophylla	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cyathochaeta avenacea				x					x	x	x		x		x	x		
Dampiera alata				x	x				x		x		x					
Dampiera hederacea				x		x		x		x			x					
Dampiera linearis			x	x				x	x	x	x			x				
Dampiera sp.									x									
Darwinia sp.													x					
Darwinia thymoides subsp*. thymoides*				x														
Darwinia thymoides				x														
Daviesia cordata				x														
Daviesia decurrens	x		x	x	x	x			x	x	x							
Daviesia horrida	x				x	x						x						
Daviesia incrassata														x				
Daviesia preissii											x		x					
Daviesia rhombifolia			x	x														
Desmocladus fasciculatus	x			x	x		x		x	x	x	x	x	x	x	x		
Desmocladus flexuosus	x	x		x		x			x	x	x	x	x	x	x	x		
Dianella revoluta								x		x			x	x				
Drosera collina	x				x	x			x									
Drosera sp.	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x		
Drosera sp. (climbing)								x				x	x					
Drosera sp. 2							x	x		x	x							
Eriochilus dilatatus				x														
Eucalyptus marginata	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Eucalyptus megacarpa	x		x			x							x					
Eucalyptus patens	x	x	x	x	x	x		x			x	x						
Eucalyptus resinifera	x																	
Eucalyptus rudis	x	x																
Gahnia decomposita			x															
Gastrolobium calycinum																x		
Gastrolobium spinosum				x		x			x		x	x						
Gastrolobium villosum	x			x	x	x		x					x					
Gompholobium cyaninum					x			x	x		x					x		

APPENDIX D: SUMMARY OF PLANT SPECIES BY SITE-VEGETATION TYPES IN MYARA EAST SURVEY AREA

* denotes introduced soecies

	Site-Vegetation Types																	
Species	**A**	**AC**	**CW**	**D**	**DA**	**DG**	**E**	**G**	**P**	**PS**	**PW**	**R**	**S**	**SP**	**ST**	**SW**	**TS**	**W**
Gompholobium knightianum			x	x		x	x		x	x	x	x	x			x	x	
Gompholobium marginatum	x	x	x	x	x	x	x	x	x	x	x	x	x			x		
Gompholobium polymorphum	x			x			x		x	x	x	x	x			x		
Gompholobium preissii				x		x	x		x	x	x		x	x	x	x		
Gompholobium preissii				x		x			x	x	x	x	x	x	x	x		
Gompholobium tomentosum				x						x								
Gompholobium villosum								x										
Gonocarpus sp.				x														
Goodenia trinervis											x							
Grevillea ?endlicheriana				x		x												
Grevillea bipinnatifida	x	x	x	x		x	x	x	x	x	x	x	x		x	x	x	
Grevillea manglesii		x																
Grevillea pulchella				x	x				x	x	x	x	x	x	x	x		
Grevillea wilsonii	x			x		x	x	x	x	x	x	x		x	x	x		
Haemodorum ?sparsiflorum								x										
Haemodorum sp.											x							
Hakea amplexicaulis													x					
Hakea cyclocarpa	x	x		x	x	x	x		x	x	x		x			x		
Hakea incrassata										x								
Hakea lissocarpha	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
Hakea prostrata	x	x		x	x	x						x						
Hakea ruscifolia	x	x		x	x	x		x	x	x	x	x	x	x		x		
Hakea stenocarpa	x																	
Hakea trifurcata								x										
Hakea undulata	x		x	x				x			x	x	x					
Hakea undulata													x					
Hakea varia	x	x		x		x		x										
Hakea trifurcata						x												
Hemigenia pritzelii				x					x	x	x		x					
Hemiphora bartlingii									x		x							
Hibbertia acerosa				x					x			x	x					
Hibbertia amplexicaulis	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Hibbertia commutata	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Hibbertia hypericoides		x		x				x	x	x	x		x		x	x		
Hibbertia lasiopus										x		x						
Hibbertia ovata	x											x	x			x		
Hibbertia perfoliata	x								x	x	x		x	x	x	x		

APPENDIX D: SUMMARY OF PLANT SPECIES BY SITE-VEGETATION TYPES IN MYARA EAST SURVEY AREA

* denotes introduced soecies

	Site-Vegetation Types																	
Species	**A**	**AC**	**CW**	**D**	**DA**	**DG**	**E**	**G**	**P**	**PS**	**PW**	**R**	**S**	**SP**	**ST**	**SW**	**TS**	**W**
Hibbertia silvestris	x							x										
Hibbertia sp.				x						x	x		x					
Hovea chorizemifolia				x				x	x	x	x	x	x			x		
Hyalosperma cotula				x							x		x					
Hypocalymma angustifolium	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Hypocalymma cordifolium			x															
Hypocalymma robustum	x	x		x									x					
Hypolaena exsulca	x										x		x					
Isopogon dubius	x					x							x					
Isopogon sp. Darling Range (F. Hort 1662)									x	x	x							
Isotoma hypocrateriformis			x								x		x			x		
Jacksonia furcellata				x														
Kennedia coccinea				x					x	x	x	x	x			x		
Kennedia prostrata	x			x							x	x	x	x				
Kingia australis				x			x		x		x							
Labichea punctata				x									x					
Lagenophora huegelii				x							x		x					
Lasiopetalum cardiophyllum P4										x								
Lasiopetalum floribundum			x	x		x	x	x	x	x	x	x	x	x	x	x	x	
Lasiopetalum glabratum	x			x					x				x					
Laxmannia sp.				x														
Laxmannia squarrosa											x							
Lechenaultia biloba				x			x	x	x	x	x	x	x		x			
Lepidosperma sp.	x		x	x	x	x		x	x	x	x	x	x	x	x	x		
Lepidosperma squamatum	x												x			x		
Lepidosperma tenue	x																	
Lepidosperma tetraquetrum	x	x	x			x					x							
Leptocarpus ?canus	x																	
Leptomeria cunninghamii				x		x						x	x		x	x		
Leptospermum erubescens	x	x		x	x	x		x	x	x	x	x				x		x
Leptospermum oligandrum	x										x							
Leucopogon australis													x					
Leucopogon capitellatus					x			x	x	x	x	x	x		x		x	
Leucopogon verticillatus				x		x		x	x	x			x				x	
Levenhookia pusilla								x			x	x						
Levenhookia stipitata				x					x		x					x		
Lindsaea linearis				x							x					x		

APPENDIX D: SUMMARY OF PLANT SPECIES BY SITE-VEGETATION TYPES IN MYARA EAST SURVEY AREA

* denotes introduced soecies

		Site-Vegetation Types																	
	Species	**A**	**AC**	**CW**	**D**	**DA**	**DG**	**E**	**G**	**P**	**PS**	**PW**	**R**	**S**	**SP**	**ST**	**SW**	**TS**	**W**
	Lomandra ?integra															x			
	Lomandra caespitosa	x	x		x		x	x	x	x	x	x	x	x	x	x	x	x	
	Lomandra hermaphrodita	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Lomandra micrantha	x			x					x	x	x		x			x	x	
	Lomandra micrantha													x			x		
	Lomandra nigricans				x					x	x	x		x				x	
	Lomandra preissii	x	x								x			x					
	Lomandra sericea				x				x	x	x		x		x				
	Lomandra sonderi	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Lomandra sp.	x			x					x	x	x	x	x	x		x		
	Lomandra spartea				x	x	x	x	x	x	x	x	x	x	x	x	x		
	Loxocarya cinerea	x			x					x	x	x		x					
	Lyginia barbata		x																
	Macrozamia riedlei	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Marianthus drummondianus								x					x					
PL	*Melaleuca armillaris*	x																	
	Melaleuca incana subsp. incana	x																	
	Melaleuca lateritia	x	x		x		x												
	Melaleuca parviceps	x			x	x			x	x	x	x							
	Melaleuca preissiana	x		x		x	x		x										
	Melaleuca rhaphiophylla	x	x																
	Melaleuca sp.			x	x	x				x		x							
	Melaleuca viminea	x	x				x												
	Melaleuca viminea subsp. ?vimninea	x																	
	Melaleuca ?preissiana					x													
	Melaleuca parviceps				x							x					x		
	Mesomelaena tetragona	x	x		x		x												
	Mirbelia dilatata		x	x	x														
	Monotaxis occidentalis				x				x		x								
	Morelotia octandra										x								
	Myrtaceae sp				x														
	Netrostylis sp. Jarrah Forest (R. Davis 7391)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Neurachne alopecuroidea	x			x	x				x	x	x		x		x	x		
	Olax benthamiana			x															
	Opercularia echinocephala	x			x	x	x		x	x	x	x	x	x	x	x	x		
*	Orchidaceae sp								x		x			x		x			
	Orchidaceae sp.										x			x					

APPENDIX D: SUMMARY OF PLANT SPECIES BY SITE-VEGETATION TYPES IN MYARA EAST SURVEY AREA

* denotes introduced soecies

		Site-Vegetation Types																	
	Species	**A**	**AC**	**CW**	**D**	**DA**	**DG**	**E**	**G**	**P**	**PS**	**PW**	**R**	**S**	**SP**	**ST**	**SW**	**TS**	**W**
*	Orchidaceae sp. 1										x								
	Orianthera serpyllifolia													x					
	Patersonia babianoides											x					x		
	Patersonia occidentalis	x		x	x	x	x	x	x	x	x	x		x	x		x		
	Patersonia pygmaea									x		x	x		x				
	Patersonia rudis	x	x		x					x	x	x		x	x	x	x		
	Patersonia sp.									x									
	Pentameris airoides				x				x					x			x		
	Pentapeltis peltigera			x	x	x	x	x		x	x	x	x	x	x	x	x		
	Pericalymma ellipticum	x	x		x	x	x					x							
	Persoonia angustiflora						x												
	Persoonia elliptica	x			x					x	x			x			x		
	Persoonia longifolia	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Petrophile serruriae				x					x				x			x		
	Petrophile striata	x			x		x		x	x	x	x	x	x			x		
	Philotheca spicata	x			x	x							x	x			x		
	Phyllanthus calycinus	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Pimelea ?angustifolia				x	x								x					
	Pimelea ciliata				x				x	x		x	x	x					
	Pimelea sp.	x			x				x										
	Pimelea suaveolens				x					x	x	x		x	x		x		
	Platysace compressa	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x
	Platysace filiformis				x					x	x	x		x		x	x	x	
	Platysace tenuissima									x				x			x		
	Poaceae sp.				x					x					x				
	Pteridium esculentum			x	x		x				x							x	
	Pterochaeta paniculata	x	x		x	x	x			x	x	x					x		
	Pterostylis sp.													x					
	Ptilotus drummondii var. *drummondii*										x								
	Ptilotus manglesii				x		x			x	x	x	x				x		
	Pyrorchis nigricans													x					
	Rytidosperma caespitosum				x	x	x		x	x	x	x	x	x	x	x	x		
	Rytidosperma setaceum				x									x					
	Scaevola calliptera								x	x	x	x	x	x	x	x	x		
*	*Selago corymbosa*				x														
	Senecio diaschides													x					
	Senecio leucoglossus P4													x					

APPENDIX D: SUMMARY OF PLANT SPECIES BY SITE-VEGETATION TYPES IN MYARA EAST SURVEY AREA

* denotes introduced soecies

	Site-Vegetation Types																	
Species	**A**	**AC**	**CW**	**D**	**DA**	**DG**	**E**	**G**	**P**	**PS**	**PW**	**R**	**S**	**SP**	**ST**	**SW**	**TS**	**W**
Senecio quadridentatus	x			x												x		
Senecio sp.				x									x					
Sphaerolobium medium						x				x			x					
Stachystemon vermicularis				x	x						x							
Stackhousia monogyna									x									
Stylidium ?junceum								x								x		
Stylidium amoenum			x	x		x	x	x	x	x	x	x	x	x		x		
Stylidium bulbiferum	x					x											x	
Stylidium calcaratum		x						x	x			x						
Stylidium ciliatum				x									x					
Stylidium diuroides subsp. *diuroides*							x	x	x		x			x				
Stylidium eriopodum					x	x		x										
Stylidium piliferum	x			x		x	x	x	x	x	x	x	x	x		x	x	
Stylidium scariosum											x			x		x		
Stylidium schoenoides										x	x		x					
Stylidium sp.				x		x			x		x							
Styphelia discolor				x			x	x	x	x	x	x	x		x	x		
Styphelia discolor									x	x	x		x	x				
Styphelia nitens	x							x	x	x	x		x					
Styphelia pallida	x			x	x	x			x	x	x	x	x	x	x			
Styphelia propinqua	x			x	x	x			x	x	x	x	x	x	x	x		
Styphelia sp.				x				x								x		
Styphelia tenuiflora	x			x	x	x			x	x	x		x	x	x	x		
Synaphea petiolaris	x							x	x		x							
Synaphea sp.						x			x	x	x							
Taxandria linearifolia	x	x	x	x	x	x	x					x					x	
Taxandria linearifolia	x																	
Tetrarrhena laevis				x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Tetratheca hirsuta			x	x		x	x	x	x	x	x	x	x		x	x		
Thomasia paniculata			x															
Thysanotus dichotomus			x	x			x		x	x	x	x	x	x	x			
Thysanotus fastigiatus			x	x		x	x	x	x	x	x	x	x	x		x		
Thysanotus multiflorus								x	x	x	x	x	x	x	x	x		
Thysanotus thyrsoideus				x					x		x		x			x		
Trachymene pilosa											x		x	x		x		
Trichocline spathulata				x			x	x	x	x	x		x			x		
Tricoryne elatior									x									

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	Site-Vegetation Types																	
Species	**A**	**AC**	**CW**	**D**	**DA**	**DG**	**E**	**G**	**P**	**PS**	**PW**	**R**	**S**	**SP**	**ST**	**SW**	**TS**	**W**
Tripterococcus brunonis											x							
Trymalium ledifolium	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
Trymalium odoratissimum	x	x	x	x	x	x			x		x	x	x	x	x			
Verticordia huegelii						x		x										
Verticordia pennigera								x										
Verticordia plumosa								x										
Verticordia densiflora	x																	
Xanthorrhoea gracilis	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Xanthorrhoea preissii	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Xanthorrhoea sp.				x									x					
Xanthosia atkinsoniana									x	x	x		x		x			
Xanthosia candida				x			x	x	x	x	x	x	x	x	x	x		
Xanthosia gracilis											x		x					
Xanthosia huegelii					x				x	x			x		x			
Xanthosia sp.													x					
Xanthosia ciliata											x							
Xylomelum occidentale				x					x	x	x					x		

ASSESSMENT OF FLORA AND VEGETATION VALUES

ALCOA OF AUSTRALIA LAREGO SURVEY AREAS, WA

Prepared By

Mattiske Consulting Pty Ltd

Prepared For

Alcoa of Australia Limited

October 2022




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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

DAWE: Department of Agriculture, Water and the Environment

DBCA: Department of Biodiversity, Conservation and Attractions

EP Act: *Environmental Protection Act 1986* (WA)

EPA: Environmental Protection Authority

EPBC Act: *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

MCPL: Mattiske Consulting Pty Ltd

IBRA: Interim Biogeographical Regionalisation for Australia

PEC: Priority ecological community

TEC: Threatened ecological community

WAH: Western Australian Herbarium (PERTH)

EXECUTIVE SUMMARY

Mattiske Consulting Pty Ltd was commissioned in 2021 by Alcoa of Australia Ltd (Alcoa) to initially conduct a desktop assessment to evaluate the potential flora and vegetation values at the Larego survey areas approximately 145 km south east of Perth, WA. This latter desktop assessment was then followed by detailed mapping of the areas within the Larego survey areas. The Larego survey areas consists of two polygons located south of the Willowdale bauxite mining operation within tenement ML 1SA. The Larego survey areas have been assessed by Mattiske Consulting Pty Ltd at a regional mapping scale as part of the Regional Forest Agreement (RFA) project by Mattiske and Havel (1998).

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

The Larego survey areas occur within the Northern Jarrah Forest subregion of the Southwest Botanical Province. The geology of the region comprises lateritic duricrust, with drainage lines and occasional granite hills. The Northern Jarrah Forest subregion is characterised by Jarrah (*Eucalyptus marginata*) forest on ironstone gravels and Marri-Wandoo (*Corymbia calophylla - Eucalyptus wandoo*) woodlands on loamy soils, with sclerophyll understoreys. The vegetation of the region has been extensively studied, and has been described in a series of vegetation complexes of the Darling System by Heddle *et al.* (1980) and Mattiske and Havel (1998).

Potential Flora Values

A total of 528 vascular plant taxa, representative of 205 genera and 80 families, have the potential to occur within the wider Larego survey areas. The most commonly represented families were Fabaceae (66 taxa), Proteaceae (46 taxa) and Myrtaceae (38 taxa). The most commonly represented genera in the Larego wider areas were *Acacia* (25 taxa), *Stylidium* (18 taxa) and *Hibbertia* (14 taxa).

A total of 31 introduced taxa have the potential to occur in the wider Larego survey areas. Only one of the potential weeds is listed as Weeds of National Significance (DCCEEW 2022d) or as a declared pest/organism under the *Biosecurity and Agriculture Management Act 2007* (WA) (DPIRD 2022).

Recorded Flora Values

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

A total of 228 taxa from 43 families and 106 genera was recorded in the Larego survey areas and as such partly reflects the smaller survey areas. Of the 228 species, 7 were introduced or planted species; all of which are relatively smaller non-invasive species which mainly occurred near tracks and local disturbed areas.

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

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

Potential Vegetation Values

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

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

As neither the G or R site-vegetation types as defined by Havel (1975a, 1975b) were recorded on the Larego survey areas it is unlikely that the PEC as listed above occurs on the Larego survey areas. Although there was a small area of the Cooke vegetation complex as defined by Mattiske and Havel (1998) in the eastern area of the Larego survey areas, the outcrops were not reflected in the lack of the site-vegetation types G and R on the survey aeras.

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

Recorded Vegetation Values

A total of 14 site-vegetation types have been recorded on the Larego survey areas. The site-vegetation types were associated with site conditions which reflected landforms, soils and soil moisture levels. The site-vegetation types on the broader valley systems and swamps differ markedly from the forest and woodland areas on the slopes and ridges.

Potential Groundwater Dependent Ecosystems

The potential groundwater dependent ecosystems were determined on the basis of the site-vegetation types. In view of the extensive flora and vegetation studies in the northern Jarrah Forest these vegetation complexes support species and site-vegetation types that prefer and occur on seasonally moister and wetter soils on the lower slopes of the Yarragil (Yg1 and Yg2) valley systems. This approach was considered to represent a precautionary approach in the absence of detailed groundwater level data at the time of selecting the potential groundwater dependent ecosystems at this juncture.

Potential Old Growth Forest Areas

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

On the basis of potential habitat trees there are some areas within the Larego survey areas that have potential to reflect lower logging rates.

1. INTRODUCTION

Mattiske Consulting Pty Ltd was commissioned in early 2022 by Alcoa of Australia Ltd (Alcoa) to initially conduct a desktop assessment to evaluate the potential flora and vegetation values of the two Larego survey areas approximately 145 km south east of Perth, WA. This desktop assessment was then followed by detailed mapping of the areas within the Larego survey areas.

1.1. Location and Scope of Project

The Larego survey areas occur within the Northern Jarrah Forest subregion of the Southwest Botanical Province (Beard 1990), approximately 145 km south east of Perth, WA (Figure 1). The Larego survey areas consist of two polygons located south of the in the Willowdale bauxite mining operation within tenement ML 1SA (Figure 2).

Parts of this region have previously been surveyed by E. M. Mattiske and Associates (1993 to 1994) and Mattiske Consulting Pty Ltd (1996 to 2021) at a regional mapping scale as part of the Regional Forest Agreement (RFA) project by Mattiske and Havel (1998). These studies built on the earlier work of Havel (1975a and 1975b) in the northern Jarrah forest.

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

1.2. Environmental Legislation and Guidelines

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

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

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

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

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

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

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

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Scale: 1:450,000
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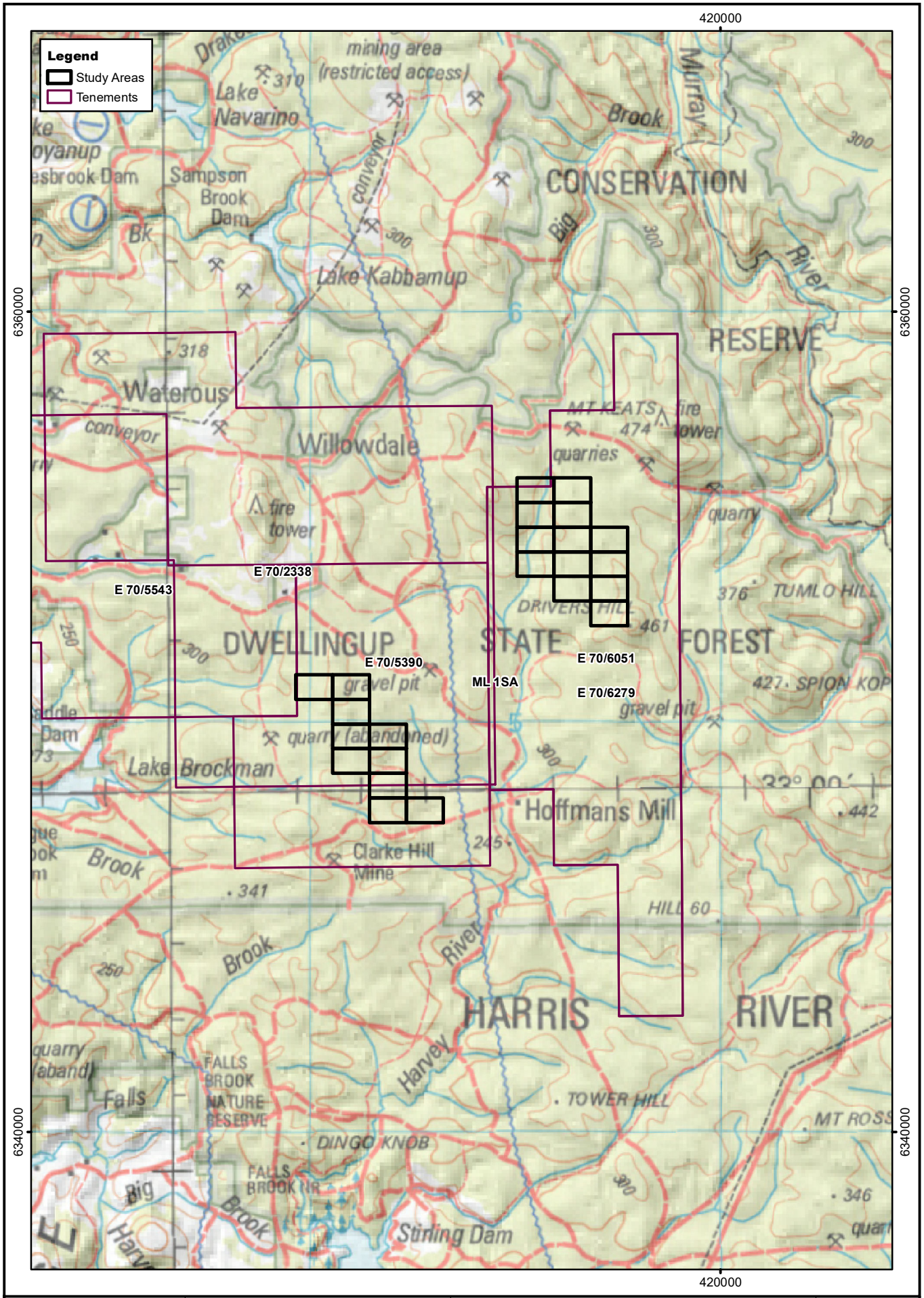
Larego
Locality

Figure: **1**



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Larego

Tenements

Figure: **2**

2. OBJECTIVES

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

- Undertake a desktop assessment of the flora and vegetation of the Larego survey areas, with an emphasis on threatened and priority flora, and threatened and priority ecological communities;
- Undertake a detailed assessment of the flora and vegetation of the Larego survey areas, with an emphasis on threatened and priority flora, and threatened and priority ecological communities;
- Review previous literature and current databases associated with the Larego survey areas;
- Review the conservation status of the vascular plant species recorded by reference to current literature and current listings by the Department of Biodiversity, Conservation and Attractions (DBCA 2022a) and plant collections held at the Western Australian Herbarium ([WAH] 1998 -), and plants listed by the Department of Climate Change, Energy and the Environment and Water [DCCEEW] (2022a) 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 (DAWE 2020b) databases were used to identify the possible occurrence of flora (including threatened and priority taxa) and threatened and priority ecological communities within the Larego survey areas. The vascular plant species recorded through this database search are summarized in Appendices B and C.

The TPFL database of threatened and priority flora and ecological communities and the Western Australian Herbarium (WAH) database (DBCA 2022b) were arranged by CAD Resources (Carine, WA). In addition, any flora recorded by Mattiske Consulting Pty Ltd (2015-2021) within or adjacent to the survey area were included.

Historical documentation and vegetation mapping of the Northern Jarrah forest subregion that provide resource material for the floristics and vegetation of the Larego areas was reviewed, including Mattiske Consulting Pty Ltd (2015-2021) reports on their flora and vegetation surveys in the nearby Larego survey areas. Nomenclature of flora species was checked against and is consistent with Florabase (WAH 1998-).

3.2. Field studies

Field studies were undertaken at 766 sites on the 120m grid systems within the approximate 1242 ha of the Larego survey areas; noting that some sections of the eastern area had already been assessed and mapped previously.

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 120 x 120 m grid system overlaid on the survey area. A total of 766 sites within the 1242 ha area were assessed with recordings on the trees (20m radius) and understorey (5m radius). Additional targeted work was undertaken on the areas between the recording sites and also on specific areas such as the outcrop and sandier valley systems and creeklines.

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

The following information was recorded at each vegetation assessment site:

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

4. DESKTOP FINDINGS

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

4.1. Climate

The survey area lies at the southern end of the Northern Jarrah Forest subregion. Beard (1990) described the climate of this area as being warm Mediterranean, with rainfall of 600 – 1200 mm per annum and 5 - 6 dry months per year. The closest weather station is the Dwellingup weather stations, located north of the Willowdale mine and Larego survey areas. Annual average rainfall at Jarrahdale (1934 -2022) is 1120.7 mm (Bureau of Meteorology [BOM] 2022). Rainfall in 2021 was higher in July and October 2021 than the longer term mean; although the summer months were again drier (Figure 3). The monthly temperatures were similar to the longer term temperatures at Dwellingup.

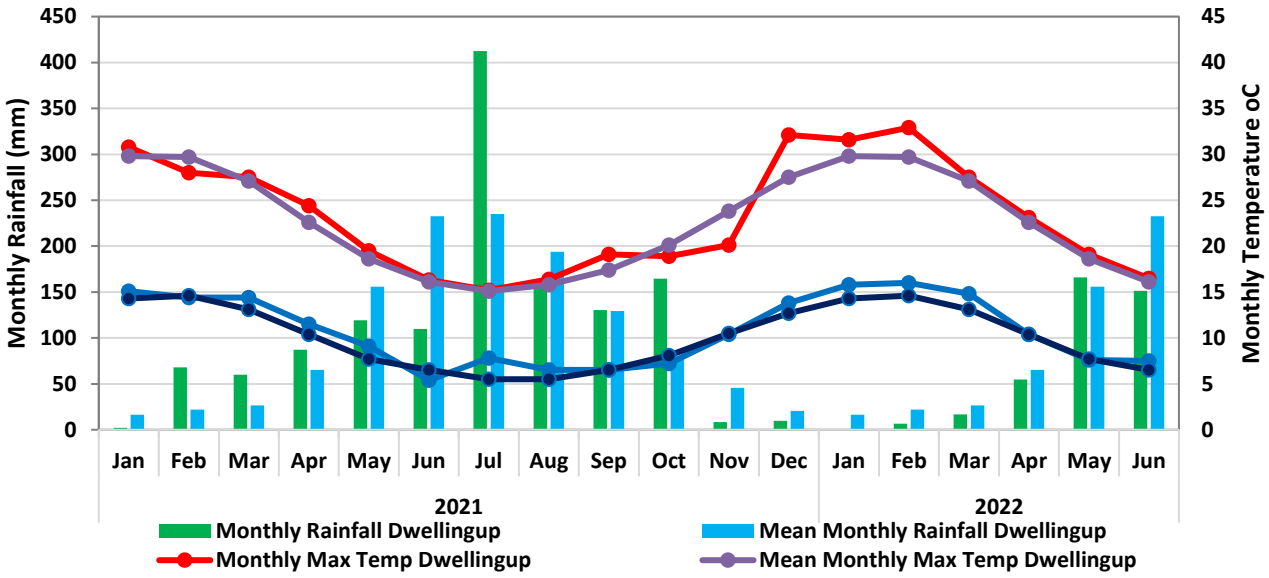


Figure 3: Climatic data for the Larego survey areas
Long term average rainfall and temperature from the Dwellingup weather stations respectively (ID 009538 respectively, years 1934-2022) (BOM 2022).

4.2. DBCA Estates

The Larego survey areas are situated in State Forest.

4.3. Geology, Soils and Topography

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

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

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

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

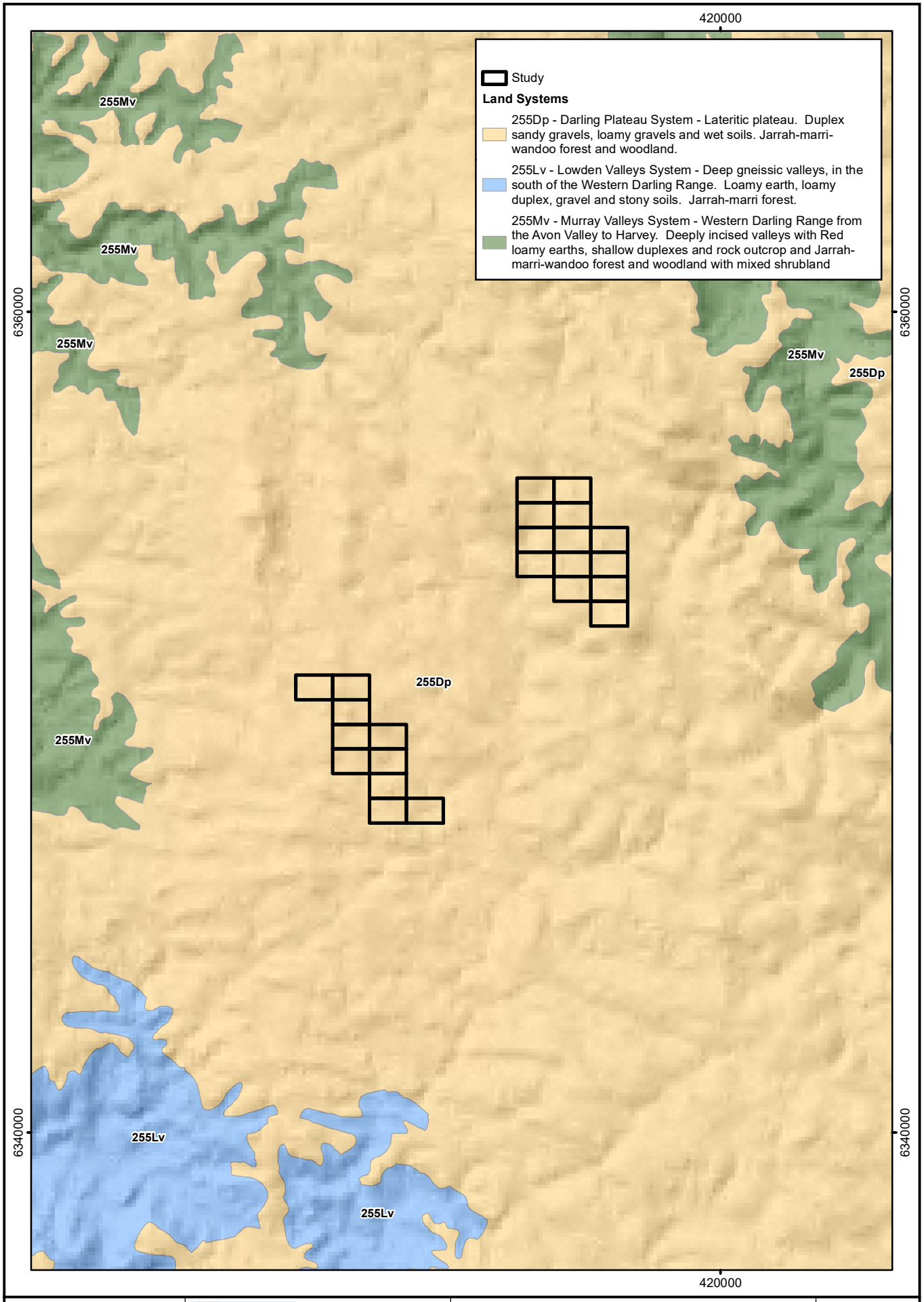
Swamp: Orange earth in swampy floors.

The Department of Primary Industries and Regional Development's (DPIRD) Land Systems present within the Larego survey areas (Figure 4, Table 1) includes the Darling Plateau System (255Dp) with two other land systems in nearby areas:

1. **Darling Plateau System (255Dp):** Lateritic plateau. Duplex sandy gravels, loamy gravels and wet soils. Jarrah-marri-wandoo forest and woodland.
2. **Murray Valleys System (255Mv):** Western Darling Range from the Avon Valley to Harvey. Deeply incised valleys with red loamy earths, shallow duplexes and rock outcrop and Jarrah-marri-wandoo forest and woodland with mixed shrubland.
3. **Lowden Valleys System (255Lv):** Deep gneissic valleys, in the south of the Western Daring Rang. Loamy eart, loamy duplex gravel and stony soils. Jarrah-Marri forests.

Table 1: Extent of Land Systems intersecting the Larego survey areas

Land System	Mapping Unit	Total Extent (ha)	Area of Intersection with the Larego East survey area	Proportion of Current Extent (%)
Darling Plateau System	255Dp	820265.76	702.002	0.086
Land System	**Mapping Unit**	**Total Extent (ha)**	**Area of Intersection with the Larego West survey area**	**Proportion of Current Extent (%)**
Darling Plateau System	255Dp	820265.76	540.001	0.066



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Larego
Land Systems

Figure: **4**

4.4. Regional Vegetation

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

The Pre-European vegetation systems present within the Larego survey areas (Figure 5, Table 2) include:

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

Table 2: Extent of pre-European vegetation associations intersecting the Larego survey areas

System	Vegetation Association	State-wide Pre-European Extent (ha)	Area of Intersection with the Larego East survey area (ha)	Proportion of Current Extent (%)
West Darling	3.3	485225.883	702.002	0.145%
System	**Vegetation Association**	**State-wide Pre-European Extent (ha)**	**Area of Intersection with the Larego West survey area (ha)**	**Proportion of Current Extent (%)**
West Darling	3.3	485225.883	540.001	0.111%

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

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

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

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

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

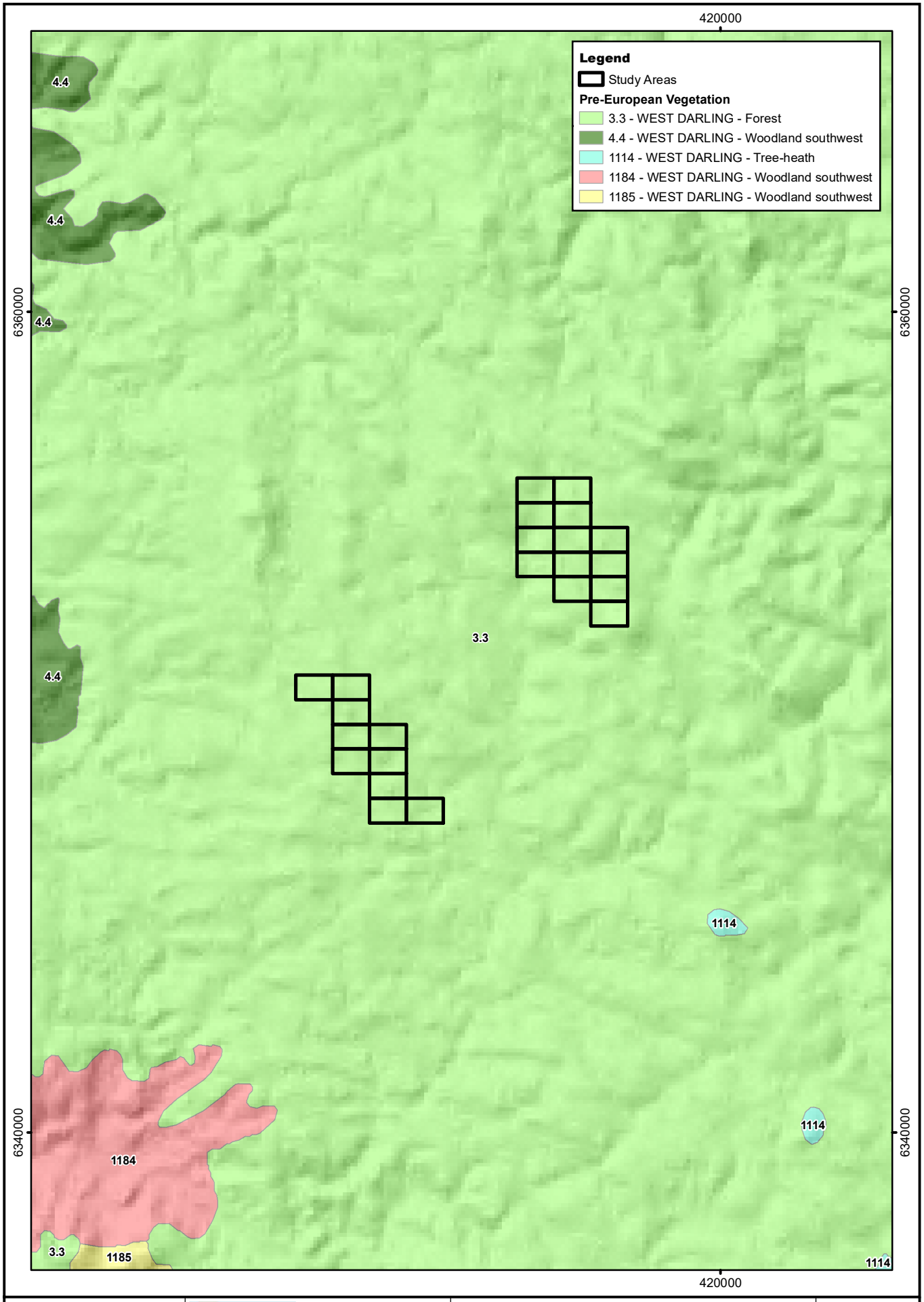
Swamp (S): Mosaic of low open woodland of *Melaleuca preissiana – Banksia littoralis*, closed scrub of Myrtaceae spp., closed heath of Myrtaceae spp. and sedgelands of *Baumea* and *Leptocarpus* spp. on seasonally wet or moist sand, peat and clay soils on valley floors in all climatic zones.

Table 3: Extent of Vegetation Complexes intersecting the Larego survey areas

Vegetation Complex	Vegetation Class	Total Extent (ha)	Area of Intersection with the Larego East survey area (ha)	Proportion of Regional Extent (%)
Swamp	S	76245.98	47.70	0.06
Cooke	Ce	51872.10	22.73	0.04
Dwellingup 1	D1	297624.85	459.74	0.15
Yarragil 2	Yg2	71234.37	171.84	0.24
Vegetation Complex	**Vegetation Class**	**Total Extent (ha)**	**Area of Intersection with the Larego West survey area (ha)**	**Proportion of Regional Extent (%)**
Cooke	Ce	51872.10	-	-
Dwellingup 1	D1	297624.85	397.36	0.13
Yarragil 1	Yg1	113828.12	141.47	0.12
Yarragl 2	Yg2	71234.37	1.17	0.002

The Cooke and Swamp units that are more likely to support a range of Priority species are relatively restricted to the eastern areas of the Larego survey areas.

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 2020c). 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).



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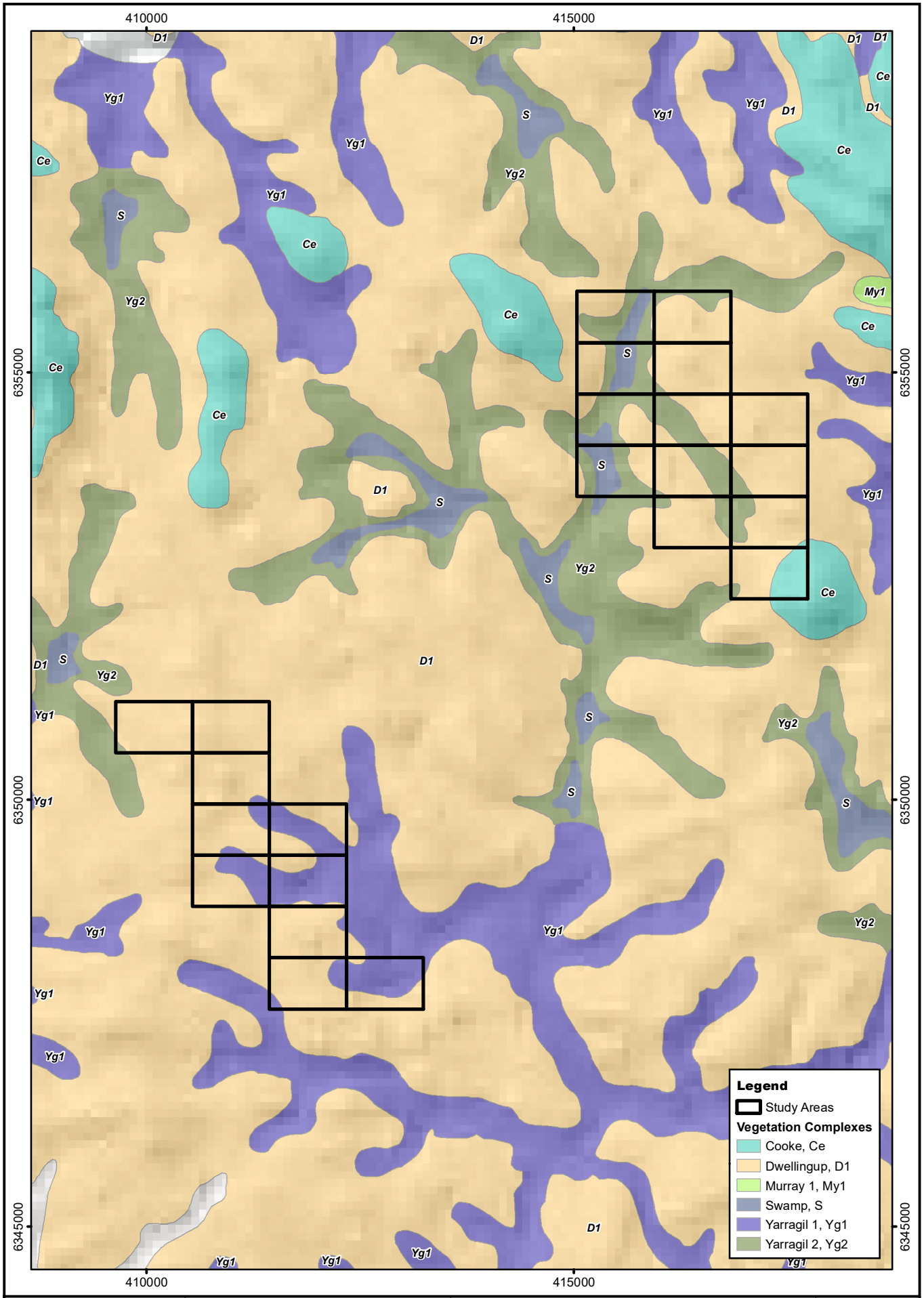
Laregó

Pre-European Vegetation

Figure: **3**



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Laregó

Vegetation Complexes

Figure: **6**

4.5. Potential Flora

A total of 528 vascular plant taxa, representative of 205 genera and 80 families, have the potential to occur within the wider Larego survey areas. The most commonly represented families were Fabaceae (66 taxa), Proteaceae (46 taxa) and Myrtaceae (38 taxa). The most commonly represented genera in the Larego wider areas were *Acacia* (25 taxa), *Stylidium* (18 taxa) and *Hibbertia* (14 taxa).

A total of 31 introduced taxa have the potential to occur in the wider Larego survey areas. Only one of the potential weeds is listed as Weeds of National Significance (DCCEEW 2022d) or as a declared pest/organism under the *Biosecurity and Agriculture Management Act 2007* (WA) (DPIRD 2022).

4.6. Potential Threatened and Priority Flora

Ten threatened flora species, pursuant to section 179 of the *EPBC Act* and as listed by DCCEEW (2020a) or pursuant to Part 2, Division 1 and Subdivision 2 of the *BC Act* and as listed by DBCA (2022a) have the potential to occur in the Larego survey areas. Of these threatened species only *Morelotia australiensis* has a moderate potential (Appendices B and C). The majority of the Threatened species occur on the Swan Coastal Plain or on the Darling Scarp and as such reflect the difficulty of applying a radial review of State and National datasets.

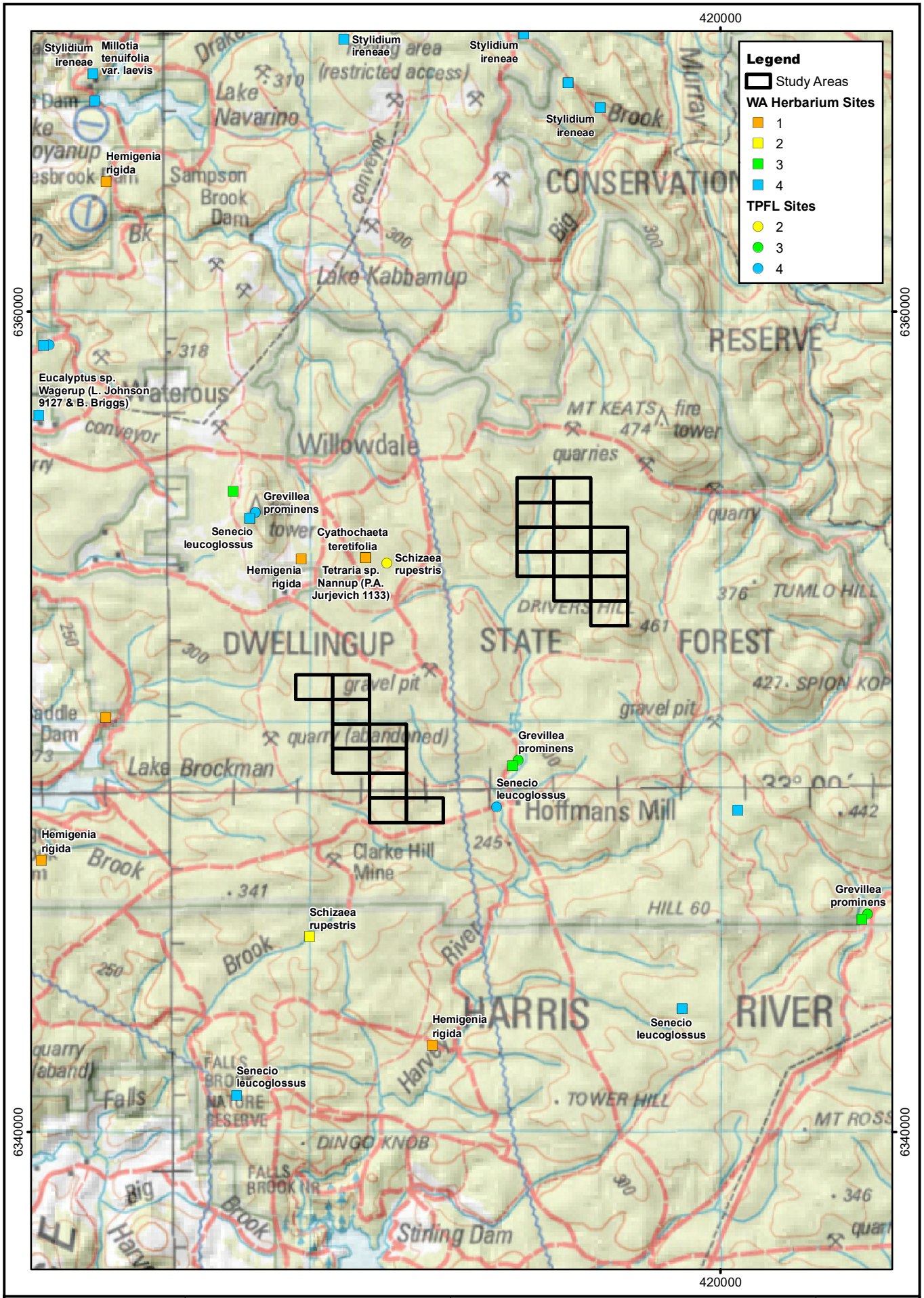
A total of 30 priority flora species as listed by DBCA (2022a) have the potential to occur within the Larego survey areas (Appendices B and C, Figure 7). All potential threatened and priority flora are listed in Appendix C, along with their State and Federal Conservation Codes (see Appendix A for definitions), a description and an assessment of the likelihood of their occurrence in the Larego survey areas.

The likelihood that these species would occur within the survey area 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, Appendix C. Records that have been documented either within or in close proximity of the Larego survey areas were ranked as Moderate or High

Of the 30 Priority flora species, no Priority 1, two Priority 2, two Priority 3 and four Priority 4 flora species had a moderate to high likelihood of occurrence, mainly due to previous records in the area and suitable habitat (Appendix C).



Larego
Threatened & Priority Flora

Figure: **7**

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

A total of 31 introduced taxa may potentially exist in the wider Larego survey areas, based on NatureMap (DBCA 2007-), the *EPBC Act* Protected Matters Search Tool (DCCEEW 2020b) search results (Appendix D) and records from Mattiske Consulting Pty Ltd's (2015-2021) surveys near Larego. One of these species, **Rubus ulmifolius* var. *ulmifolius* is a declared pest organisms pursuant to section 22 of the BAM Act and a Weeds of National Significance (DCCEEW 2020d). An assessment of the likelihood that the weed species (Weeds of National Significance and/or declared pest organisms) would occur within the Larego 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. The results in Appendix summarise the *Oxalis* sp. as one record, and these are summarized in Appendix D as three Oxalis weed species that may occur in the area.

Based on this assessment, 5 of the weed species had a high likelihood and ten of the weed species had a moderate likelihood of occurring in the Larego survey areas.

4.8. Dieback

The extent of dieback from datasets supplied by the Department Biodiversity, Conservation and Attractions highlights the extent within the Larego survey areas and adjacent forest areas, Figure 8.

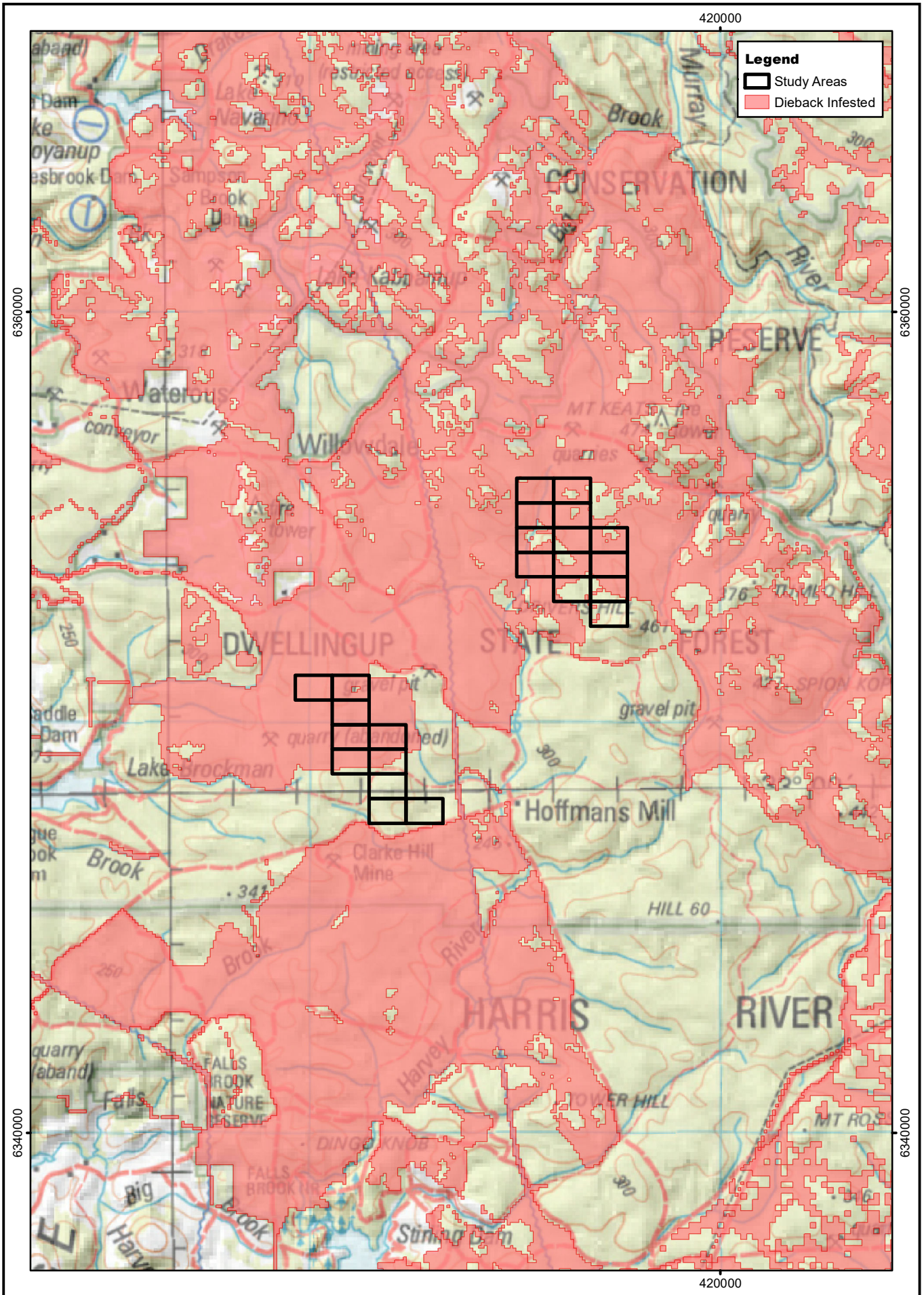
4.9. Groundwater Dependant Ecosystems

The potential groundwater dependent ecosystems were determined on the basis of the extent of the vegetation complexes such as the Swamp, Yarragil 1 and Yarragil 2 that occur within the Larego survey areas. In view of the extensive flora and vegetation studies in the northern Jarrah Forest these vegetation complexes support species and site-vegetation types that prefer and occur on seasonally moister and wetter soils. This approach was considered to represent a precautionary approach in the absence of detailed groundwater level data at the time of selecting the potential groundwater dependent ecosystems at this juncture.

Key indicator plant species that are generally accepted as indicators of moister soils and, hence, potential groundwater dependent ecosystems include – *Banksia littoralis, Hakea varia, Acacia divergens, , Boronia molloyae, Thomasia paniculata, Astartea scoparia, Babingtonia camphorosmae, Eucalyptus rudis, Hypocalymma angustifolium, Hypocalymma cordifolium, Melaleuca preissiana, Melaleuca lateritia, Melaleuca viminea* and *Taxandria linearifolia.*

4.10. Old Growth Forests

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



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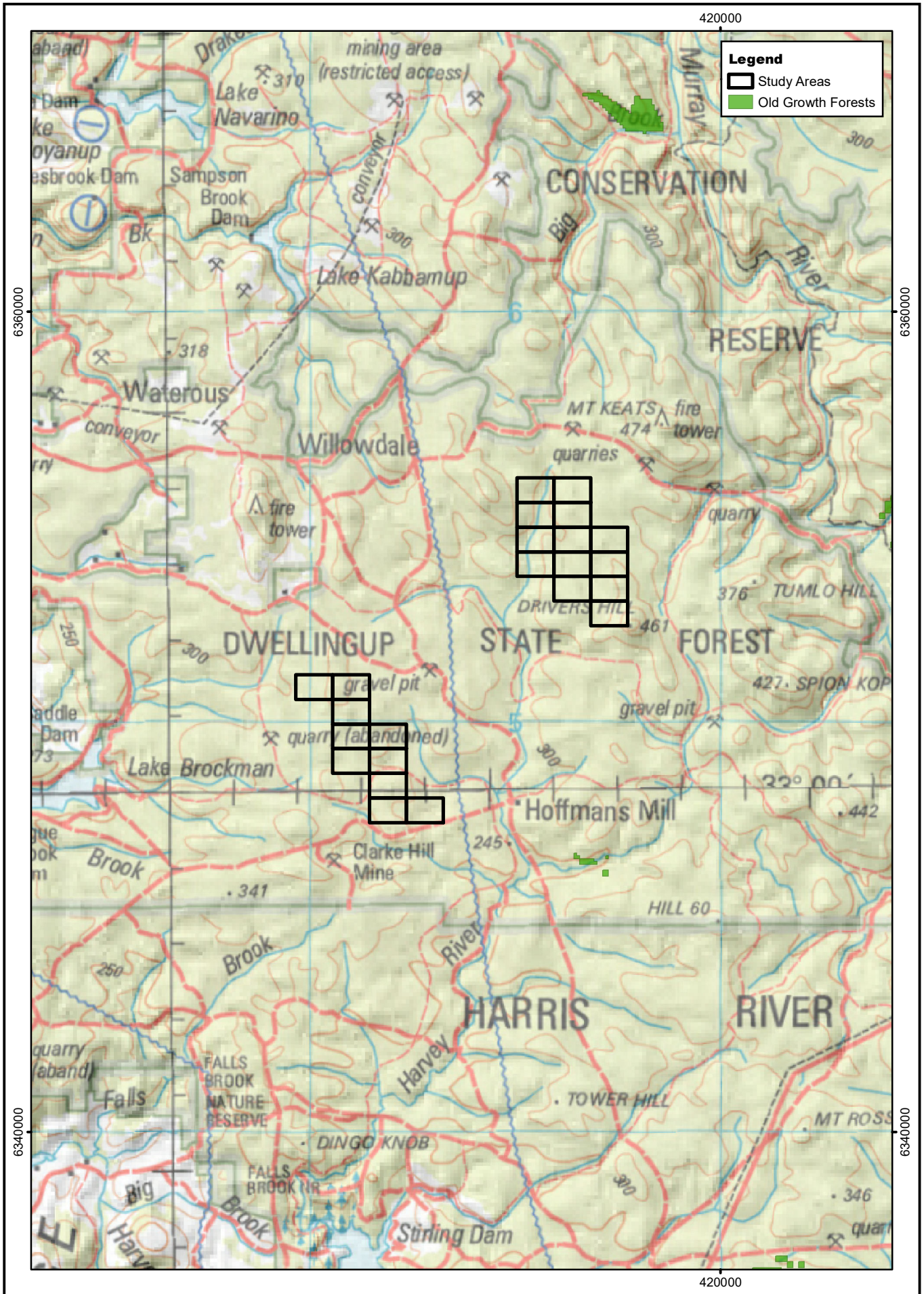
Larego

Dieback

Figure:

8



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Laregó

Old Growth Forests

Figure: **9**

4.11. Previous Surveys

Over the past forty years, Mattiske Consulting has previously mapped the vegetation associated with the Willowdale (including previous Larego areas; Mattiske Consulting Pty Ltd 2015, 2019, 2020, 2021).

4.12. Potential Threatened and Priority Ecological Communities

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

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

4.13. Wetlands of International Importance (Ramsar)

No wetlands of international importance listed at Commonwealth level pursuant to sections 181 and 182 of the *EPBC Act* and listed by the DCCEEW (2022f) occur within the Larego survey areas. The closest wetlands of international importance occur on the Swan Coastal Plain.

5. FIELD STUDIES FINDINGS

The following text summarizes the key findings from recent studies in 2022 within the Larego survey areas; which includes recording sites for vegetation mapping and opportunistic and targeted assessments.

5.1. Survey Effort

The survey efforts has been undertaken over a decade from multiple studies within the Willowdale and Larego areas. The major effort in 2022 which when combined with the depth of previous studies in adjacent areas for both Alcoa and also other clients leads to the conclusion that the work exceeds the current EPA Guidance Statement (2016a and 2016b) expectations for flora and vegetation studies.

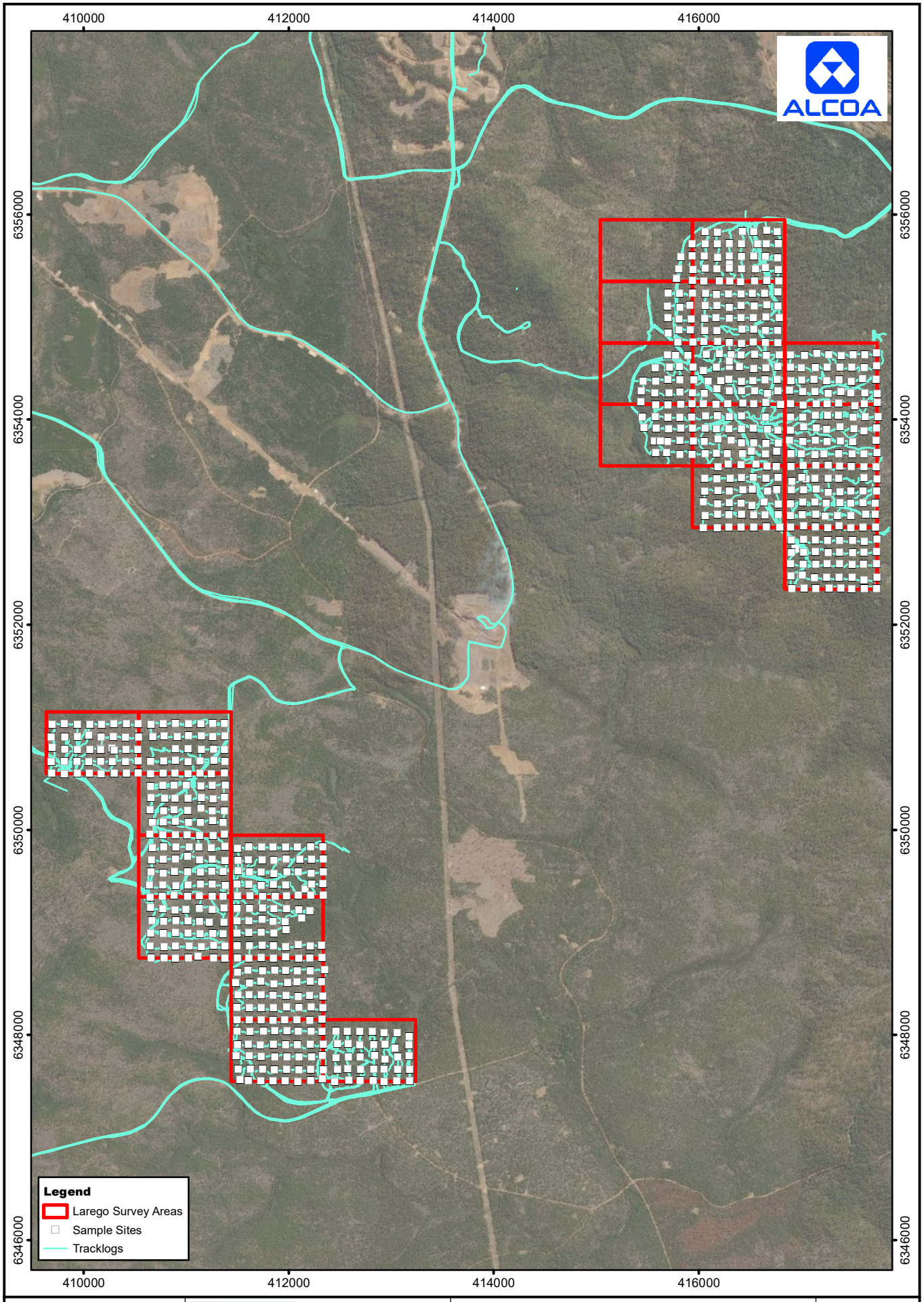
The survey effort to date has included (See Figure 10):

- More than 100 kilometres of foot transects which includes the mapping efforts and targeted searches;
- 766 recording sites in 2022 on a grid system which varied slightly from 120m x 120m with some sites closer than this average and some slightly wider. This pattern of recording is consistent with previous ecological studies in the northern Jarrah forest for both Alcoa and other clients in nearby areas;
- targeted searches of additional extreme sites that are variable within the broader Yarragil and Swamp vegetation complexes as well as the variable communities on the valley slopes and ridges in the Larego survey areas. The coverage of the flora on the granite and swamp areas relied on the recording sites and targeted searching;
- detailed and consistent data collection on position in the landscape, soils, flora, vegetation and vegetation condition.
- consistent interpretation in line with previous site-vegetation studies where there is a greater reliance on key indicator species and a series of site parameters rather than the accepted clustering and groupings. Such an approach differs from the EPA guidance statement, but if the latter was followed the dominance of some tree and understorey species in the analyses would lead to a less comprehensive delineation of biodiversity values and also be inconsistent with the approach adopted on all other Alcoa leases where detailed flora and vegetation studies have been undertaken in the past by the Mattiske team and site personnel. In summary, the survey effort easily exceeds the expectations of the EPA Guidance Statement (2016a, 2016b).

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

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

Potential Survey Limitation	Impact on Survey
Sources of information and availability of contextual information (*i.e.* pre-existing background versus new material)	**Not a constraint:** Reference resources such as mapping by Beard (1979), Mattiske and Havel (1998), previous vegetation mapping completed for Alcoa by E.M Mattiske and Associates and Mattiske Consulting Pty Ltd teams together with online flora and vegetation information, has provided an appropriate level of information for the current survey.
Scope (*i.e.* what life forms, *etc.*, were sampled)	**Not a constraint:** Vascular flora, which were the focus of the present survey was sampled on a close grid pattern within the survey area. In addition to the regular sampling sites, searches were undertaken to assess the likelihood of threatened and priority flora species.
Proportion of flora collected and identified (based on sampling, timing and intensity)	**Not a constraint:** The survey areas near Willowdale and Larego areas have been sampled over multiple years, with the more recent work on the detailed records on the grid system and targeted searches between sites. The recent survey effort in the majority of the areas was undertaken in summer to spring months 2022 (February 2022 to August 2022). The botanists undertaking the field surveys have had extensive experience working with the flora of the Jarrah forest. Any flora which could not be identified in the field was collected for subsequent identification. A few taxa were only recorded at genus level as flowering was not occurring.
Mapping reliability	**Not a constraint:** The vegetation was mainly assessed on a 120m x 120m grid pattern within the survey area. Over 100 kilometres were surveyed within the survey area. This together with 766 recording sites and the targeted and opportunistic survey sites (particularly near the granites and swamp areas) enabled intensive coverage of the values on the Larego survey areas and therefore the associated mapping of key flora values and the site-vegetation types with a high level of confidence.
Timing, weather, season, cycle	**Minor constraint:** The EPA (2016a) recommends that flora and vegetation surveys in the South – West Botanical Province be conducted in Spring (September-November). The intensive work undertaken in sections of Larego has enabled coverage of different seasons. The detailed survey work commenced in *February 2022 and continued to August 2022*. In view of extensive work in the areas adjacent to the survey areas this is considered to be only a minor constraint.
Disturbances (fire flood, accidental human intervention, *etc.*)	**Not a constraint:** With the exception of previous logging activities and occasional old forestry tracks, the vegetation of the survey area is largely undisturbed. In view of the 40 years of experience by Dr Mattiske in northern Jarrah forest vegetation mapping the latter is not considered to lead to any constraints.
Access problems (*i.e.* ability to access survey area)	**Not a constraint:** Vehicle access through the Larego survey areas was only restricted in small sections.
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 a range of other clients, and thus were familiar with the local flora and vegetation values. Dr Mattiske has more than 40 years of ecological experience in flora and vegetation studies in the southwest forests at a detailed floristic level, as well as detailed and regional vegetation assessment level.



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Larego
Survey Effort

Figure:

10

5.2. Flora

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

A total of 228 taxa from 43 families and 106 genera was recorded in the Larego survey areas and as such partly reflects the smaller survey area.

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

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

Source	Families	Genera	Native Taxa	Introduced Taxa
Larego Survey areas 2022	43	106	228	7
Nature Map and Additional Potential and recorded Species (see Appendix B)	80	205	528	31

Of interest is the shift in landforms and soils from west to east across the survey areas and the latter is reflected in the change in the dominance of flora species that tolerate the broader valley systems and swamp areas. The summary of results from the plots and the recording sites as summarized by the site-vegetation types reflects this shift from species in the lateritic slopes and ridges and the broader valleys (see Appendix E).

5.3. Introduced Flora Species

Of the 228 species, 7 were introduced or planted species. The introduced species all occur more widely in the Jarrah forest and are not listed as WONS weeds at the National scale or as Declared pests at the State level.

5.4. Threatened and Priority Flora

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

Two Priority flora species as listed by DBCA (2022a) have been recorded in the Larego survey areas (Appendix B), Table 6 and Figure 11.

Table 6: Summary of Priority Flora recorded in Larego survey areas

SPECIES	Federal Conservation Status	State Conservation Status	Site-vegetation Types	Population
Grevillea prominens	-	P3	S	10
Senecio leucoglossus	-	P4	Ts, T	1 to 5

Grevillea prominens (P3) is known from 9 records at the State Herbarium (DBCA 2007-) and has been recorded east of the western Larego survey area and south east of the eastern Larego survey area and was recorded on lateritic gravelly soils. This species has been recorded in the wider Jarrah forest (DBCA 2007-).

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

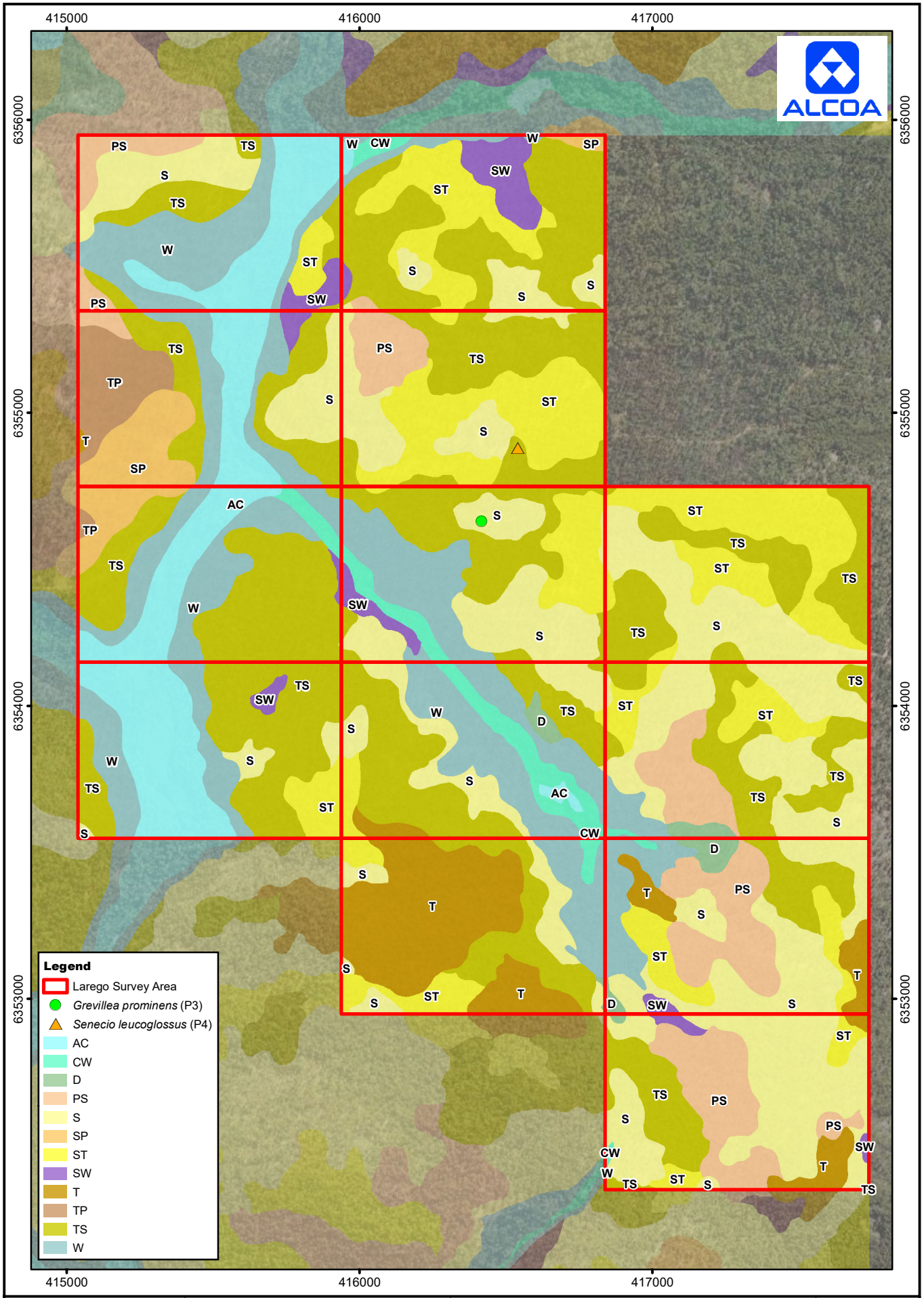
5.5. Site-vegetation Types

A total of 15 site-vegetation types were defined and mapped in the Larego survey areas, Table 7 and Figure 11. The site-vegetation types were subdivided into three main groupings associated with site conditions which reflected landforms, soils and soil moisture levels, Table 7. The site-vegetation types on the extreme sites such as broad valley systems and swamps differ markedly from the forest and woodland areas on the slopes and ridges. The delineation of the site-vegetation types was based on the earlier work of Havel (1975a and 1975b) and as such rely on key site and species indicators. Whilst Mattiske has refined these initial site-vegetation types there is still a reliance on the original work of Havel (1975a and 1975b). The initial code is the dominant site-vegetation type code and the second code (where added) reflects some local influence of secondary key stone species. These site-vegetation types were developed in consultation with Dr David Goodall (formerly CSIRO at the time). In the 1970's Dr Havel and Dr Goodall undertook extensive analyses to delineate and differentiate the key species and site parameters that assist in the division of the continuum of the dominant trees of *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri). This approach has been used for some 45 years and as such to deviate from such an approach and rely on other approaches would negate the effort to date and the ability to align the findings with other areas in the northern Jarrah forest. So whilst such an approach might be perceived by assessors to deviate from the EPA guidance statements, to not adopt the site-vegetation approach would diminish the delineation of the biodiversity values in the Larego survey areas. In addition the ranking of species and condition of species in the field has increased the intensity and coverage of the sites within the Larego survey areas.

The dominant site-vegetation types were S, ST and TS (59.79%) on the slopes ad ridges and D, W, SW and PW on the moister slopes (20.27%). The more extreme sites associated with swamps (types A, AC and CW) covered less than 7.6% of the areas, Table 7.

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

The site-vegetation types of PW and SW reflect the moister soils that may influence the spread and intensification of *Phytophthora cinnamomi.* As indicated in the Dieback data from DBCA (Figure 8) it is evident that dieback has influenced the condition of the vegetation in the Larego survey areas.



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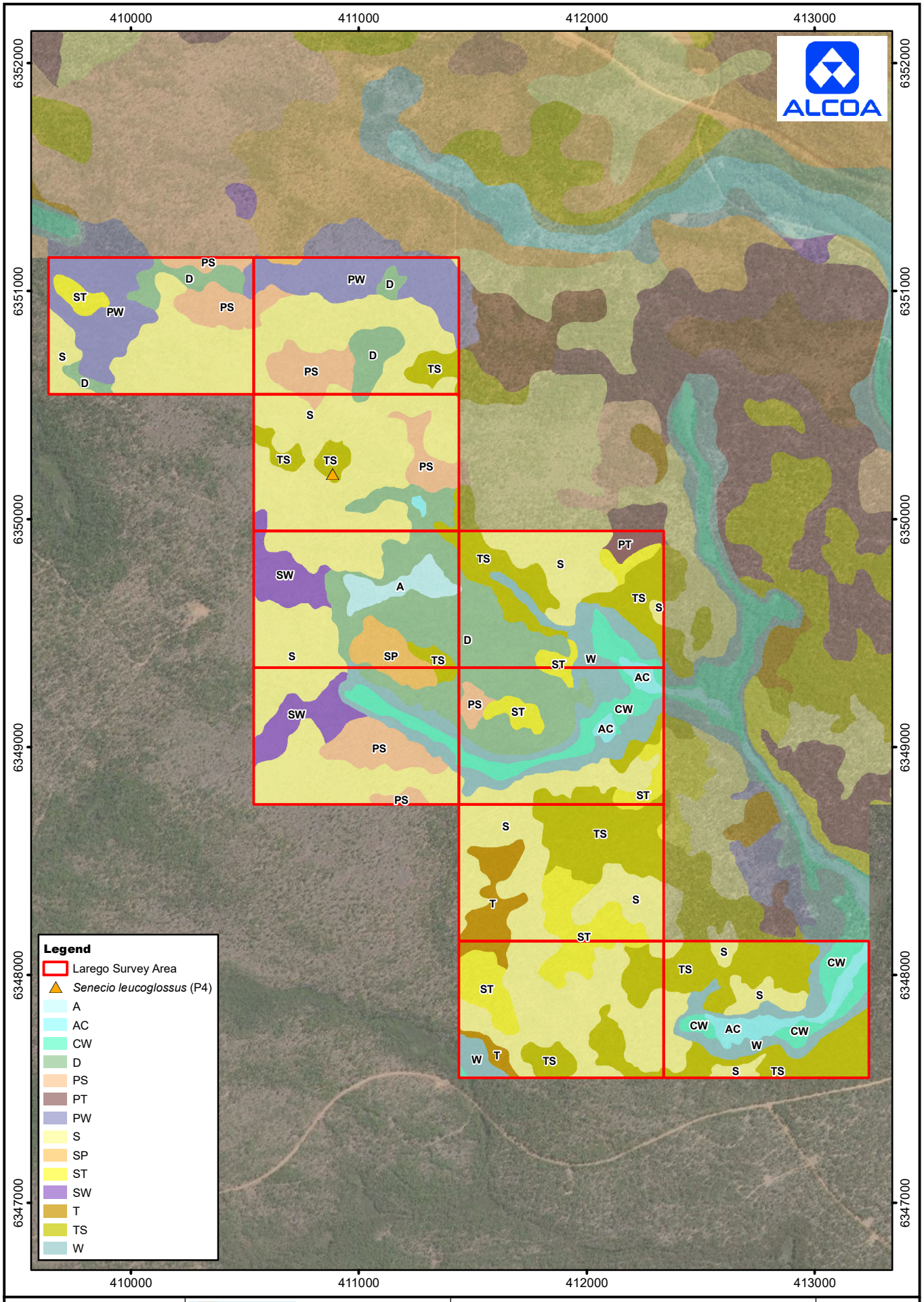
Larego - East
Vegetation

Figure:

11.1



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Laregro - West
Vegetation

Figure:

11.2

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

SVT Code	Description	Area_ Ha	% Total
Swamps (A, AC) and Creeklines (C, CW)			
A	Tall shrubland of *Melaleuca lateritia, Hakea varia, Melaleuca viminea* and *Melaleuca incana* subsp. *incana* on clay-loams in seasonally wet valley floors.	5.44	0.44
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.	57.03	4.59
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.	31.86	2.56
Lower Slopes (D, W) and Moister Slopes (PW and SW)			
D	Open Forest of *Eucalyptus marginata -Corymbia calophylla – Hakea prostrata* on lower slopes with mixed low understorey species, including *Babingtonia camphorosmae* and *Acacia extensa* on clay loams to gravelly clay-loams.	66.15	5.33
W	Open Forest of *Eucalyptus megacarpa - Eucalyptus patens – Corymbia calophylla* on lower slopes with mixed low understorey species, including *Acacia extensa* and *Hypocalymma angustifolium* on seasonally moister sandy-loam gravelly soils.	127.20	10.24
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.	30.83	2.48
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.	27.53	2.22
Slopes and Upper Ridges (PS, PT, S, SP, ST, TP, TS, T)			
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.	74.73	6.02
PT	Open Forest of *Allocasuarina fraseriana - Eucalyptus marginata - Corymbia calophylla - Banksia grandis* with scattered understorey, including *Adenanthos barbiger, Leucopogon verticillatus, Pteridium esculentum* and *Bossiaea aquifolium* subsp. *aquifolium* on sandy-loam gravels.	2.22	0.18
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.	350.79	28.24
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.	20.57	1.66
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.	117.54	9.46
TP	Open Forest of *Allocasuarina fraseriana - Eucalyptus marginata - Corymbia calophylla* with scattered understorey, including *Clematis pubescens*, *Adenanthos barbiger, Leucopogon verticillatus, Pteridium esculentum* and *Bossiaea aquifolium* subsp. *aquifolium* on sandy-loam gravels.	9.49	0.76
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.	274.20	22.08
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.	46.42	3.74

5.6. Vegetation Condition

The majority of the vegetation was ranked as good to excellent despite historical harvesting activities, dieback and some established tracks in the area. As indicated in Figure 8 and Section 4.8. The presence of the dieback disease is particularly evident in the condition of the vegetation on the lower slopes that support D, SW and PW site-vegetation types.

5.7. Threatened and Priority Ecological Communities

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

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

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

5.8. Old Growth Forests

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

On the basis of the number of potential habitat trees there are some areas of Larego areas that have some potential to reflect lower logging rates (Figures 12 and 13).

In reviewing the data as collected within the Larego survey areas it is apparent that the swamp areas (A and AC) supported few larger trees and the site-vegetation types (ST, T, TS and PS) supported proportionally higher number of larger potential habitat trees (Diameter at Breast Height (DBH) > 50cm).

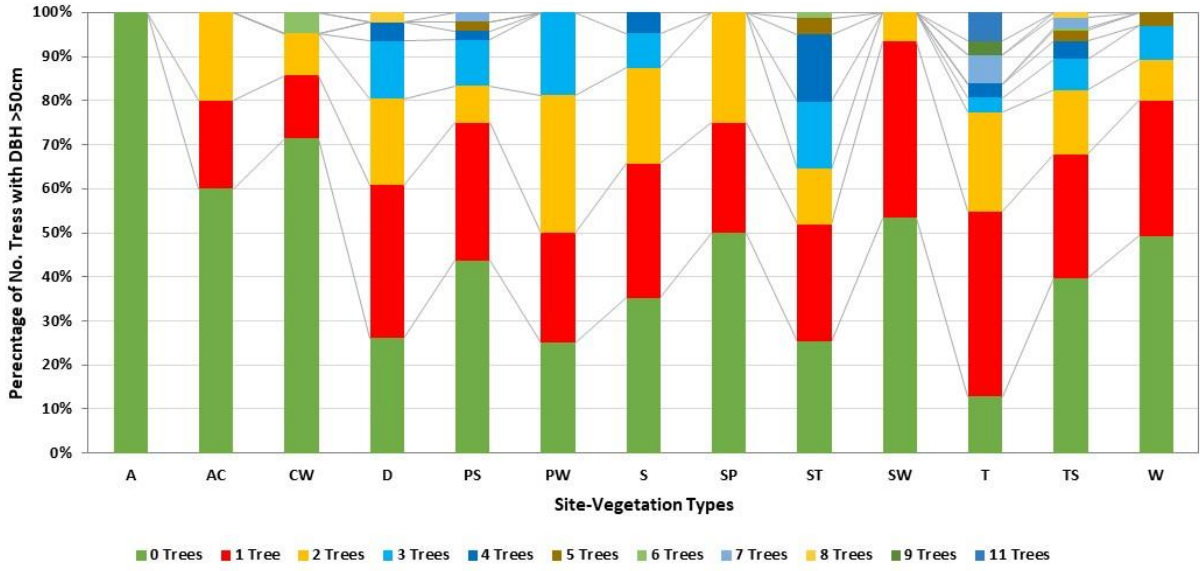
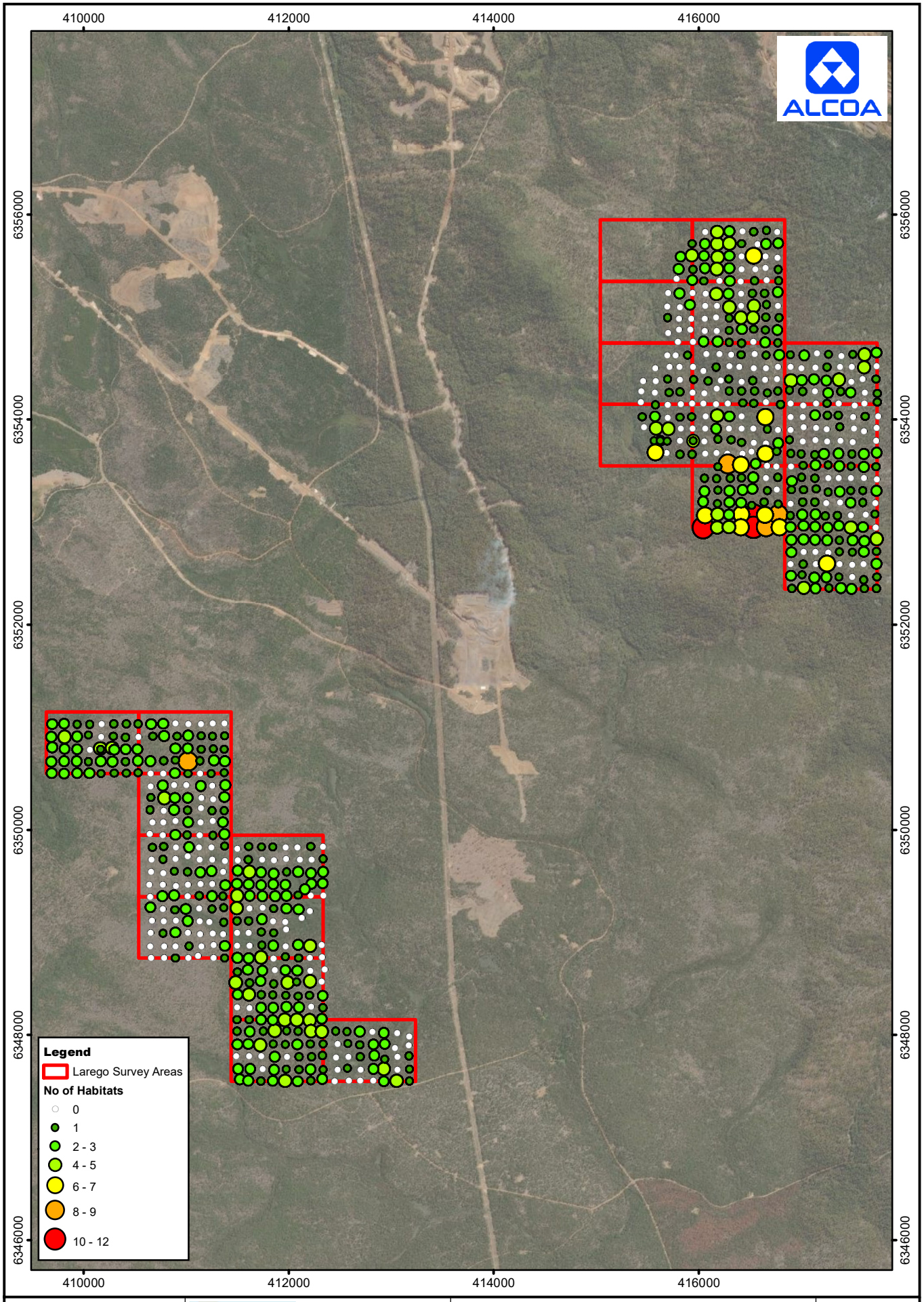


Figure 12: Summary of Number of Potential Habitat Trees (>50cm DBH) in the respective Site-vegetation Types on Larego survey areas



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Larego
Potential Habitat Trees

Figure:

12

6. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

6.1. Flora

The survey efforts were undertaken over 7 months, largely in late summer and early spring as these rains were variable during 2022. The seasonal work in the Larego survey areas and nearby survey areas in recent years was considered to exceed the EPA (2016a and 2016b) guidance statements expectations.

A total of 228 taxa was recorded in the Larego survey areas. This is within the range that would be expected in the smaller area of Willowdale. Of the 228 species, 7 were introduced or planted species. The seven introduced species all occur more widely in the Jarrah forest and are not listed as WONS weeds at the National scale or as Declared pests at the State level.

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

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

Of interest is the shift in landforms and soils from west to east across the survey areas and the latter is reflected in the change in the dominance of flora species that tolerate the broader valley systems, swamps of the Yarragil and Swamp complexes and the slopes and ridges of the Dwellingup complex.

6.2. Vegetation

The survey area is situated within Beard's (1990) Northern Jarrah Forest subregion of the Southwest Province. The Northern Jarrah Forest subregion is characterised by Jarrah (*Eucalyptus marginata*) forest on ironstone gravels and Marri-Wandoo (*Corymbia calophylla* - *Eucalyptus wandoo*) woodlands on loamy soils, with sclerophyll understoreys. Dell and Havel (1989) broadly classified the Jarrah Forest as an open forest in its northern extent and as a tall forest in its southern extent.

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

A total of 15 site-vegetation types were defined and mapped in the Larego survey areas, Table 7 and Figure 11. The site-vegetation types were subdivided into three main groupings associated with site conditions which reflected landforms, soils and soil moisture levels, Table 7. The site-vegetation types on the extreme sites such as broad valley systems and swamps differ markedly from the forest and woodland areas on the slopes and ridges. The delineation of the site-vegetation types was based on the earlier work of Havel (1975a and 1975b) and as such rely on key site and species indicators. Whilst Mattiske has refined these initial site-vegetation types there is still a reliance on the original work of Havel (1975a and 1975b). The initial code is the dominant site-vegetation type code and the second code (where added) reflects some local influence of secondary key stone species. These site-vegetation types were developed in consultation with Dr David Goodall (formerly CSIRO at the time). In the 1970's Dr Havel and Dr Goodall undertook extensive analyses to delineate and differentiate the key species and site parameters that assist in the division of the continuum of the dominant trees of *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri). This approach has been used for some 45 years and as such to deviate from such an approach and rely on other approaches would negate the effort to date and the ability to align the findings with other areas in the northern Jarrah forest. So whilst such an approach might be perceived by assessors

to deviate from the EPA guidance statements, to not adopt the site-vegetation approach would diminish the delineation of the biodiversity values in the Larego survey areas. In addition the ranking of species and condition of species in the field has increased the intensity and coverage of the sites within the Larego survey areas.

The dominant site-vegetation types were S, ST and TS (59.79%) on the slopes ad ridges and D, W, SW and PW on the moister slopes (20.27%). The more extreme sites associated with swamps (types A, AC and CW) covered less than 7.6% of the areas, Table 7.

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

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

6.3. Potential Groundwater Dependent Ecosystems

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

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

6.4. Threatened and Priority Ecological Communities

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

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

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

6.5. Old Growth Forests

There are a few patches of old growth forests occurring outside the Larego survey areas; however based on data supplied by the Department of Biodiversity, Conservation and Attractions no areas have been highlighted within the Larego survey areas. As indicated by the summary of potential habitat trees (with DBH >50cm) the swamp and valley areas supported less larger trees than some of the site-vegetation types on the slopes and ridges.

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8. PERSONNEL

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

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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] (2018a) 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 (DBCA 2019). 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 (2019).

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 2019). 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 (2019).

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 2018b). 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 Department of Environment and Conservation (2013).

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 (2020a) in the *Priority Ecological Communities for Western Australia – Version 29 (05 May 2020)*. 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 Department of Environment and Conservation (2013).

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 2020).

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: VEGETATION CONDITION SCALE (adapted from Keighery 1994 and Trudgen 1988 and as summarized in EPA Guidance Statement 2016b and modified to adjust to "forest" areas)

Vegetation Condition	EPA Definition (2016b) - South West and Interzone Botanical Provinces	Comments reflecting condition ratings for "Forest" areas (including diversity of structural and floristic composition areas)	Clearing Agriculture Residential	Post-Mining & Rehabilitation	Tracks & Roads	Logging Harvest Records, Stumps	Dieback	Introduced Flora Species
Pristine	Pristine or nearly so, no obvious signs of disturbances caused by human activities since European settlement.	Very restricted areas as most areas been subject to some disturbance.	None	None	None	No Logging (old growth forest)	None obvious, limited / no vulnerable species	Limited / no presence
Excellent	Vegetation Structure intact, disturbance affecting individual species and weeds are non-aggressive. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional tracks.	Very little evidence of logging in past. Occasional tracks, past burning, no obvious dieback, presence of short-lived non-aggressive weed.	None	None	Occasional tracks	Predominantly mature forest (last harvest > 70 years ago)	None obvious, limited / no vulnerable species	Non aggressive weeds
Very Good	Vegetation Structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.	Some modification to structural components through past logging activities, repeated fires. Grazing only by native animals in forests. No obvious dieback, presence of short-lived non-aggressive weed.	None	None	Occasional tracks	Immature forest (last harvest > 20, < 70 years ago)	Limited dieback infestation on localised areas, limited vulnerable species	Non-aggressive weeds
Good	Vegetation Structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.	Some modification to structural and floristic components through past mining and logging activities. Occurrence of repeated fires that have impacted vegetation. Grazing mainly by native animals in forests and occasional feral animal (e.g. pigs).	Localised partial clearing near past logging activities and tracks and previous facilities	Rehabilitation areas with structural and/or floristic components developing and persisting (post 2000, Grant and Koch 2007)	Occasional tracks and informal roads	Juvenile forest (last harvest < 20 years ago)	Extensive dieback infestation, prevalent vulnerable species, some structural impact	Aggressive weeds and non-aggressive weeds reflecting disturbance
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.	Basic vegetation structure severely impacted by disturbance. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.	Partial clearing near past logging activities and tracks and previous facilities	Rehabilitation areas with lower species diversity (pre 2000, Grant and Koch 2007) and/or early phases of regrowth and establishment of tree species with potential for shift to Good	Extensive tracks, informal roads	Logged land is expected to recover to Good (juvenile forest)	Extensive dieback infestation, dominant vulnerable species, severe structure impact	High density of aggressive weeds or presence of introduced crop species or plantation species
Completely Degraded	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 crops species with isolated native trees and shrubs.	Mostly cleared areas supporting only occasional native trees or planted trees, mainly small agricultural holdings or residential and highly modified areas.	Cleared agricultural and residential areas.	Recently cleared mine areas, rehabilitation not completed.	Extensive tracks and roads	Logged land is expected to recover to Good if rehabilitation undertaken	Extensive dieback infestation, dominant vulnerable species, structure no longer intact.	Plantations, understorey is predominantly introduced species.

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN THE LAREGO AREA

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Family		Species	Data source							
			SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
Amanitaceae		*Amanita fibrillopes*				x				
Amaranthaceae		*Ptilotus manglesii*					x			
Anarthriaceae		*Lyginia* sp.					x			
Apiaceae		*Actinotus glomeratus*				x				
		Actinotus leucocephalus				x				
		Actinotus repens (P3)	P3			x				
		Daucus glochidiatus				x				
		Pentapeltis peltigera					x	x	x	x
		Pentapeltis silvatica				x		x		
		Platysace compressa					x	x	x	x
		Platysace filiformis				x	x	x		x
		Platysace tenuissima					x	x		x
		Platysace sp.								x
		Xanthosia atkinsoniana				x	x		x	x
		Xanthosia candida				x	x	x	x	x
		Xanthosia ciliata						x		
		Xanthosia huegelii				x	x	x		x
		Xanthosia singuliflora				x				x
		Xanthosia tasmanica				x				
		Xanthosia sp.						x		x
Apocynaceae		*Parsonsia diaphanophleba* (P4)	P4			x				
	*	*Vinca major*				x				
Araliaceae		*Hydrocotyle callicarpa*				x				
		Trachymene pilosa				x		x		x
Asparagaceae		*Chamaescilla corymbosa*								x
		Laxmannia squarrosa					x		x	
		Lomandra brittanii					x			x
		Lomandra caespitosa				x	x		x	x
		Lomandra hermaphrodita				x	x		x	x
		Lomandra integra				x				
		Lomandra micrantha					x			x
		Lomandra micrantha subsp. *micrantha*				x	x			x
		Lomandra nigricans				x	x		x	x
		Lomandra pauciflora				x				
		Lomandra preissii				x			x	x
		Lomandra purpurea					x		x	x
		Lomandra sericea				x	x	x	x	x
		Lomandra sonderi					x	x	x	x
		Lomandra spartea					x	x	x	x
		Lomandra suaveolens						x		
		Lomandra sp.				x	x	x	x	x

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Family		Species	Data source							
			SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
Asparagaceae (continued)		*Thysanotus dichotomus*				x	x	x		x
		Thysanotus fastigiatus				x		x		x
		Thysanotus manglesianus				x		x		
		Thysanotus multiflorus				x	x	x	x	x
		Thysanotus thyrsoideus				x	x	x		x
		Thysanotus sp.					x			
Asteraceae		*Cotula australis*				x				
	*	*Cotula coronopifolia*				x				
	*	*Erigeron sumatrensis*						x		
		Euchiton collinus				x				
		Hyalosperma cotula								x
	*	*Hypochaeris glabra*				x	x	x	x	x
		Lagenophora huegelii				x	x	x	x	x
		Millotia tenuifolia				x			x	
		Millotia tenuifolia var. *laevis* (P2)	P2			x				
		Olearia paucidentata				x		x		
		Olearia strigosa (P3)	P3			x				
		Pterochaeta paniculata				x	x	x	x	x
		Quinetia urvillei				x				
		Senecio diaschides				x		x		x
		Senecio hispidulus					x		x	x
		Senecio leucoglossus (P4)	P4			x		x	x	x
		Senecio multicaulis subsp. *multicaulis*				x				
		Senecio quadridentatus						x	x	x
	*	*Senecio vulgaris*								x
		Senecio sp.					x	x	x	x
	*	*Sonchus oleraceus*								x
		Trichocline spathulata				x	x	x	x	x
	*	*Ursinia anthemoides*					x			
	*	*Vellereophyton dealbatum*					x			
		Xerochrysum macranthum				x				
		Asteraceae sp.					x	x		x
Boryaceae		*Borya sphaerocephala*						x		x
Brassicaceae		*Cardamine paucijuga* (P2)	P2			x				
Bryaceae		*Rosulabryum campylothecium*				x				
Campanulaceae		*Isotoma hypocrateriformis*				x				x
		Lobelia gibbosa						x		
		Lobelia sp.							x	x
	*	*Wahlenbergia capensis*								x
		Wahlenbergia preissii								x
Caprifoliaceae	*	*Lonicera japonica*				x				

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Family	Species	Data source							
		SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022

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Family	Species	Data source							
		SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
Casuarinaceae	*Allocasuarina fraseriana*				x	x	x	x	x
	Allocasuarina sp.						x		
Celastraceae	*Stackhousia monogyna*					x	x		x
	Stackhousia pubescens				x				
	Stackhousia sp.						x	x	
	Tripterococcus brunonis								x
Centrolepidaceae	*Aphelia brizula*				x				
	Centrolepis fascicularis				x				
Colchicaceae	*Burchardia congesta*				x	x	x		x
Crassulaceae	*Crassula exserta*				x				
Cupressaceae	*Callitris ?acuminata*					x			
Cyperaceae	*Cyathochaeta avenacea*				x	x	x		x
	Cyathochaeta teretifolia (P3)	P3			x	x			
	Eleocharis keigheryi (T)	T	V	x					
	Gahnia decomposita				x	x	x	x	x
	Gahnia trifida				x	x			
	Lepidosperma apricola sens. lat.					x			
	Lepidosperma gracile					x			x
	Lepidosperma leptostachyum				x	x			
	Lepidosperma longitudinale				x				
	Lepidosperma pubisquameum				x	x			x
	Lepidosperma pubisquameum sens lat.					x			
	Lepidosperma squamatum				x	x	x	x	x
	Lepidosperma tenue					x	x	x	
	Lepidosperma tetraquetrum				x	x	x	x	x
	Lepidosperma resinosum					x			
	Lepidosperma sp.					x	x	x	x
	Machaerina vaginalis				x				
	Mesomelaena graciliceps				x				
	Morelotia australiensis (T)	T	V	x	x				
	Morelotia octandra				x	x	x	x	
	Netrostylis sp. Jarrah Forest (R. Davis 7391)				x	x	x	x	x
	Netrostylis sp. Nannup (P.A. Jurjevich 1133) (P1)	P1			x				
	Cyperaceae sp.					x	x	x	x
Dasypogonaceae	*Kingia australis*					x	x		
Dennstaedtiaceae	*Pteridium esculentum*					x	x	x	x
	Pteridium esculentum subsp. *esculentum*				x				

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Family	Species	Data source							
		SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
Dilleniaceae	*Hibbertia acerosa*				x	x	x		
	Hibbertia amplexicaulis				x	x	x	x	x
	Hibbertia commutata				x	x	x	x	x
	Hibbertia glomerata				x				
	Hibbertia glomerata subsp. *glomerata*								x
	Hibbertia hypericoides					x	x	x	x
	Hibbertia lasiopus								x
	Hibbertia ovata					x	x	x	
	Hibbertia perfoliata					x	x	x	
	Hibbertia pilosa				x				
	Hibbertia serrata				x	x			
	Hibbertia silvestris				x	x	x		
	Hibbertia subvaginata							x	x
	Hibbertia sp.					x	x		x
Droseraceae	*Drosera barbigera*				x				
	Drosera collina				x				
	Drosera erythrorhiza					x	x		
	Drosera leucoblasta						x		
	Drosera pallida				x				
	Drosera pulchella				x				
	Drosera squamosa				x				
	Drosera stolonifera						x		
	Drosera sp.					x	x	x	x
Elaeocarpaceae	*Platytheca galioides*				x				
	Tetratheca hirsuta					x	x		x
	Tetratheca hirsuta subsp. *viminea*				x				
	Tetratheca parvifolia (P3)	P3			x				
	Tetratheca ?*pilifera* (P3)	P3					x		
	Tetratheca virgata							x	
	Tetratheca sp.						x		
Ericaceae	*Andersonia aristata*				x				
	Andersonia latiflora								x
	Andersonia sp.					x	x		
	Astroloma sp.					x	x		
	Leucopogon australis				x				x
	Leucopogon capitellatus				x	x	x	x	x
	Leucopogon glabellus								x
	Leucopogon gracillimus					x			
	Leucopogon hirsutus				x				
	Leucopogon verticillatus				x	x	x	x	x
	Leucopogon sp.					x	x		x
	Styphelia concinna						x		
	Styphelia discolor				x		x	x	x
	Styphelia nitens					x	x	x	x

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Family	Species	Data source							
		SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
	Styphelia pallida						x	x	x

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Family	Species	Data source							
		SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
Ericaceae (continued)	*Styphelia propinqua*				x	x	x	x	x
	Styphelia tenuiflora				x	x	x	x	x
	Styphelia sp.					x			x
Euphorbiaceae	*Amperea simulans*				x				
	Monotaxis grandiflora						x		
	Monotaxis occidentalis					x	x		
	Ricinocarpos glaucus				x				
	Stachystemon vermicularis								x
	Euphorbiaceae sp.					x			
Fabaceae	*Acacia alata*						x		x
	Acacia alata var. *alata*				x	x		x	
	Acacia browniana				x	x	x	x	
	Acacia browniana var. *browniana*					x			
	Acacia browniana var. *obscura*					x			
	Acacia celastrifolia					x	x		
	Acacia divergens				x	x	x	x	x
	Acacia drummondii subsp. *candolleana*				x	x	x	x	x
	Acacia drummondii subsp. *drummondii*					x	x	x	x
	Acacia extensa				x	x	x	x	x
	Acacia flagelliformis (P4)	P4			x				
	Acacia lateriticola				x	x	x	x	x
	Acacia myrtifolia						x		
	Acacia nervosa				x	x	x	x	x
	Acacia oncinophylla subsp. *patulifolia* (P4)	P4			x				
	Acacia preissiana						x		
	Acacia pulchella				x	x	x	x	x
	Acacia pulchella var. *pulchella*				x				
	* *Acacia pycnantha*						x		
	Acacia saligna								x
	Acacia semitrullata (P4)	P4			x				
	Acacia urophylla						x	x	x
	Acacia varia var. *varia*				x		x		
	Acacia willdenowiana					x	x		x
	Acacia sp.					x			
	Bossiaea angustifolia				x				
	Bossiaea aquifolium					x		x	x
	Bossiaea aquifolium subsp. *aquifolium*				x		x		
	Bossiaea eriocarpa								
	Bossiaea ornata				x	x	x	x	x
	Callistachys lanceolata					x			
	Chorizema cordatum				x		x	x	x
	Chorizema dicksonii						x		
	Chorizema rhombeum				x				
	Daviesia costata				x				
	Daviesia cordata						x		

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Family	Species	Data source							
		SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
	Daviesia decurrens					x	x		

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Family		Species	Data source								
			SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
Fabaceae (continued)		*Daviesia preissii*						x		
		Daviesia sp.						x		
		Eutaxia exilis				x				
		Gastrolobium glabratum				x				
		Gastrolobium spinosum								x
		Gastrolobium sp.					x			
		Gompholobium knightianum					x	x		x
		Gompholobium marginatum					x	x		x
		Gompholobium polymorphum						x		
		Gompholobium preissii						x		x
		Gompholobium tomentosum					x			
		Gompholobium sp.						x		x
		Hovea chorizemifolia				x	x	x	x	x
		Hovea trisperma				x	x	x		
		Hovea sp.								x
		Jacksonia alata				x				
		Jacksonia furcellata						x		
		Kennedia coccinea					x	x	x	x
		Kennedia prostrata				x		x		x
		Labichea punctata				x	x	x	x	x
	*	*Medicago polymorpha*				x				
		Mirbelia dilatata				x	x	x	x	x
		Paraserianthes lophantha				x		x	x	x
		Paraserianthes lophantha subsp. *lophantha*				x				
		Sphaerolobium medium				x		x	x	x
		Sphaerolobium scabriusculum				x				
		Templetonia drummondii					x			
		Templetonia sp.							x	
		Fabaceae sp.								x
Fagaceae	*	*Quercus palustris*				x				
Gentiamaceae	*	*Centaurium erythraea*								x
Goodeniaceae		*Dampiera alata*				x				
		Dampiera hederacea				x		x		
		Dampiera linearis					x			x
		Lechenaultia biloba				x	x	x	x	x
		Lechenaultia sp.					x			
		Scaevola calliptera				x	x	x		x
		Scaevola pilosa				x				
		Scaevola sp.						x		
		Goodeniaceae sp.								x
Haemodoraceae		*Anigozanthos* sp.							x	x
		Conostylis pauciflora subsp. *pauciflora* (P4)	P4			x				
		Conostylis pusilla						x		x

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Family	Species	Data source							
		SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
	Conostylis serrulata				x	x	x	x	x

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Family		Species	Data source							
			SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
Haemodoraceae (continued)		*Conostylis setigera*				x	x	x	x	x
		Conostylis setigera subsp. *setigera*				x				
		Conostylis setosa					x	x	x	x
		Conostylis sp.						x	x	
		Haemodorum laxum				x				x
		Haemodorum sp.					x	x		x
		Tribonanthes violacea				x				
		Haemodoraceae sp.						x		
Haloragaceae		*Glischrocaryon aureum*						x	x	x
		Gonocarpus benthamii				x		x		
		Gonocarpus diffusus				x				
Hedwigiaceae		*Hedwigia ciliata*				x				
Hemerocallidaceae		*Agrotocrinum hirsutum*								x
		Caesia micrantha				x				
		Chamaescilla corymbosa					x	x	x	x
		Chamaescilla corymbosa var. *corymbosa*				x				
		Chamaescilla gibsonii (P3)	P3			x				
		Chamaescilla sp.					x			
		Dianella revoluta					x		x	
		Dianella revoluta var. *divaricata*				x				
		Johnsonia lupulina				x	x			x
		Stypandra glauca				x	x			
		Tricoryne elatior				x				
		Hemerocallidaceae sp.					x			
Hypericaceae	*	*Hypericum perforatum*				x				
Hypoxidaceae		*Pauridia gardneri*					x			
Iridaceae		*Patersonia babianoides*								x
		Patersonia juncea						x		
		Patersonia occidentalis					x	x	x	x
		Patersonia pygmaea					x	x		x
		Patersonia rudis					x	x		x
		Patersonia sp.						x	x	x
		Iridaceae sp.								x
Juncaceae		*Juncus* sp.					x			
Juncaginaceae		*Triglochin nana*				x				
Lamiaceae		*Hemiandra pungens*								x
		Hemigenia microphylla (P3)	P3			x				
		Hemigenia pritzelii				x	x	x	x	x

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Family	Species	Data source							
		SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
	Lamiaceae sp.						x		

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Family		Species	Data source							
			SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
Lauraceae		*Cassytha filiformis*							x	
		Cassytha glabella								x
		Cassytha glabella forma casuarinae				x				
		Cassytha pomiformis				x				
		Cassytha sp.					x	x	x	x
Liliaceae	*	*Lilium candidum*				x				
Lindsaeaceae		*Lindsaea linearis*				x	x	x		x
Loganiaceae		*Orianthera serpyllifolia* subsp. *angustifolia*				x				
Loranthaceae		*Nuytsia floribunda*					x			
Malvaceae		*Lasiopetalum floribundum*				x	x	x	x	x
		Lasiopetalum glabratum					x	x	x	x
		Lasiopetalum sp.						x		
		Thomasia ?*macrocalyx*						x		
		Thomasia paniculata				x	x	x	x	x
		Thomasia pauciflora				x				
		Thomasia sp. Big Brook (M. Koch 2373)				x				
		Thomasia sp.					x		x	
Meliaceae	*	*Melia azedarach*				x				
Myrtaceae		*Astartea scoparia*				x	x	x	x	x
		Babingtonia camphorosmae					x	x	x	x
	*	*Callistemon citrinus*				x				
		Callistemon glaucus							x	
		Calothamnus sp.						x		x
		Calytrix depressa				x				
		Calytrix leschenaultii					x	x		
		Calytrix sp.					x	x	x	x
		Corymbia calophylla				x	x	x	x	x
		Darwinia citriodora					x			
	PL	*Eucalyptus accedens*					x			
		Eucalyptus drummondii					x			
		Eucalyptus x graniticola (P4)	P4			x				
		Eucalyptus laeliae				x				
		Eucalyptus marginata					x	x	x	x
		Eucalyptus marginata subsp. *marginata*				x				
		Eucalyptus megacarpa				x	x	x	x	x
	*	*Eucalyptus microcorys*				x	x			
		Eucalyptus patens				x		x	x	x
		Eucalyptus rudis						x	x	x
	*	*Eucalyptus saligna*				x				
		Eucalyptus sp.						x		

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Family	Species	Data source							
		SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
	Homalospermum firmum				x	x			

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Family	Species	Data source							
		SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
Myrtaceae (continued)	*Hypocalymma angustifolium*					x	x	x	x
	Hypocalymma cordifolium				x	x	x	x	x
	Hypocalymma robustum					x	x	x	x
	Hypocalymma sp.					x	x		
	Leptospermum erubescens						x		x
	Melaleuca ?parviceps					x			
	Melaleuca preissiana						x		x
	Melaleuca trichophylla						x	x	
	Melaleuca sp.						x		
	Pericalymma ellipticum					x	x	x	x
	* *Syncarpia glomulifera*				x				
	Taxandria fragrans				x				
	Taxandria linearifolia				x	x	x	x	x
	Verticordia huegelii var. *huegelii*				x				
	Verticordia plumosa var. *plumosa*				x	x			
	Myrtaceae sp.					x	x		x
Ophioglossaceae	*Ophioglossum lusitanicum*				x				
Orchidaceae	*Caladenia flava*					x			
	Caladenia flava subsp. *flava*				x				
	Caladenia latifolia								x
	Caladenia reptans								x
	Caladenia speciosa (P4)	P4			x				
	Caladenia uliginosa subsp. *patulens* (P1)	P1			x				
	Caladenia sp.				x	x			x
	Cryptostylis ovata				x	x		x	x
	Diuris micrantha (T)	T	V	x					
	Diuris purdiei (T)	T	E	x					
	Diuris sp.								x
	Drakaea elastica (T)	T	E		x				
	Eriochilus dilatatus subsp. *dilatatus*				x				
	Leporella sp.					x			
	Microtis media						x		
	Microtis sp.					x			
	Prasophyllum brownii				x				
	Pterostylis pyramidalis					x			
	Pterostylis recurva				x				
	Pterostylis scabra				x				
	Pterostylis vittata				x				x
	Pterostylis sp. Bloated snail orchid (W. Jackson BJ 486)				x				
	Pterostylis sp.					x	x	x	x
	Pyrorchis nigricans				x	x	x		x
	Thelymitra crinita				x				
	Thelymitra sp.				x				
	Orchidaceae sp.					x	x	x	x

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Family	Species	Data source							
		SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022

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Family		Species	Data source								
			SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
Orobanchaceae	*	*Orobanche minor*						x		
Oxalidaceae	*	*Oxalis* sp.						x		
Phyllanthaceae		*Lysiandra calycina*				x	x	x	x	x
Phytolaccaceae	*	*Phytolacca octandra*						x		
Pinaceae	PL*	*Pinus pinaster*					x		x	
	PL*	*Pinus* sp.					x			
Pittosporaceae		*Billardiera floribunda*				x				x
		Billardiera fraseri								x
		Billardiera fusiformis					x	x	x	x
		Billardiera variifolia				x		x		
		Billardiera sp.						x		
		Marianthus bicolor							x	
		Marianthus drummondianus						x	x	
		Pittosporaceae sp.					x			x
Plantaginaceae		*Gratiola pubescens*				x				
Poaceae	*	*Aira caryophyllea*								x
		Amphipogon amphipogonoides						x		x
		Amphipogon laguroides				x		x		
		Austrostipa sp.					x			
	*	*Briza maxima*								x
		Neurachne alopecuroidea					x	x	x	x
		Rytidosperma acerosum								x
		Rytidosperma caespitosum					x	x	x	x
		Rytidosperma pilosum				x				
		Rytidosperma sp.					x			x
		Tetrarrhena laevis				x	x	x	x	x
		Poaceae sp.					x	x	x	x
Podocarpaceae		*Podocarpus drouynianus*					x			
Polygalaceae		*Comesperma calymega*						x		x
		Comesperma virgatum				x	x	x		x
		Comesperma sp.					x			
Pottiaceae		*Barbula calycina*				x				
Primulaceae	*	*Lysimachia arvensis*						x		
Proteaceae		*Adenanthos barbiger*				x	x	x	x	x
		Adenanthos obovatus				x	x			

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Family	Species	Data source							
		SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
	Banksia dallanneyi subsp. *dallanneyi*						x		

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Family	Species	Data source							
		SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
Proteaceae (continued)	*Banksia dallanneyi* subsp. *dallanneyi* var. *dallanneyi*							x	x
	Banksia dallanneyi subsp. *dallanneyi* var. *mellicula*				x				
	Banksia dallanneyi subsp. *sylvestris*				x			x	x
	Banksia grandis				x	x	x	x	x
	Banksia littoralis					x	x	x	x
	Banksia seminuda				x			x	
	Banksia sessilis					x	x	x	x
	Banksia sphaerocarpa							x	x
	Banksia squarrosa subsp. *squarrosa*						x		
	Banksia sp.							x	x
	Conospermum capitatum subsp. *glabratum*				x	x			
	Conospermum flexuosum				x				
	Conospermum flexuosum subsp. *laevigatum*				x				x
	Conospermum stoechadis								x
	Conospermum sp.					x			
	Grevillea bipinnatifida						x		
	Grevillea bipinnatifida subsp. *pagna* (P1)	P1			x				
	Grevillea diversifolia						x		x
	Grevillea manglesii subsp. *manglesii*						x		
	Grevillea ornithopoda (P2)	P2			x				
	Grevillea prominens (P3)	P3			x				x
	Grevillea pulchella						x		
	Grevillea quercifolia				x	x			
	Grevillea synapheae				x				
	Grevillea wilsonii						x	x	x
	Hakea amplexicaulis				x	x	x	x	x
	Hakea cyclocarpa						x		
	Hakea incrassata								x
	Hakea lasianthoides				x			x	
	Hakea lissocarpha				x	x	x	x	x
	Hakea prostrata							x	x
	Hakea ruscifolia				x		x	x	x
	Hakea varia							x	
	Isopogon sphaerocephalus					x			
	Persoonia elliptica				x	x	x	x	x
	Persoonia longifolia				x	x	x	x	x
	Synaphea odocoileops (P1)	P1			x				
	Synaphea petiolaris				x	x			
	Synaphea sp. Fairbridge Farm (D. Papenfus 696) (T)	T	CE	x					
	Synaphea sp. Pinjarra Plain (A.S. George 17182) (T)	T	E	x					
	Synaphea sp. Serpentine (G.R. Brand 103) (T)	T	CE		x				
	Synaphea stenoloba (T)	T	E		x				
	Xylomelum occidentale					x			
Ranunculaceae	*Clematis pubescens*				x	x	x	x	x
Restionaceae	*Desmocladus fasciculatus*					x	x	x	x

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Family	Species	Data source							
		SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
	Desmocladus flexuosus					x	x	x	x

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Family		Species	Data source							
			SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
Restionaceae (continued)		*Hypolaena exsulca*				x	x	x	x	x
		Leptocarpus tenax				x				
		Lepyrodia curvescens (P2)	P2					x		
		Loxocarya cinerea				x				x
		Loxocarya striata					x			
		Sporadanthus rivularis				x	x			
		Restionaceae sp.					x			x
Rhamnaceae		*Trymalium ledifolium*					x	x	x	x
		Trymalium ledifolium var. *rosmarinifolium*				x				
		Trymalium odoratissimum subsp. *odoratissimum*					x	x	x	x
		Trymalium odoratissimum subsp. *trifidum*				x				
Rosaceae	*	*Rubus ulmifolius*						x		
Rubiaceae	*	*Galium murale*				x				
		Opercularia apiciflora				x				x
		Opercularia echinocephala				x	x	x	x	
		Opercularia hispidula				x				x
		Opercularia vaginata						x		
		Opercularia sp.						x		x
Rutaceae		*Asterolasia pallida*				x		x		
		Boronia capitata subsp. *gracilis* (P3)	P3			x				
		Boronia crenulata				x				x
		Boronia crenulata subsp. *crenulata*							x	
		Boronia crenulata subsp. *crenulata* var. *crenulata*				x				
		Boronia crenulata subsp. *viminea*				x				
		Boronia fastigiata				x	x	x	x	x
		Boronia molloyae				x	x	x	x	
		Boronia crenulata						x		
		Boronia sp.					x			
		Cyanothamnus tenuis				x				
		Philotheca spicata				x	x	x		x
Santalaceae		*Leptomeria cunninghamii*				x				x
Sapindaceae		*Dodonaea* sp.						x		
Schizaeaceae		*Schizaea rupestris* (P2)	P2			x				
Sematophyllaceae		*Rhaphidorrhynchium amoenum*				x				
		Rhaphidorrhynchium amoenum var. *amoenum*				x				
Solanaceae		*Anthocercis gracilis* (T)	T	V	x					

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Family	Species	Data source							
		SCC	FCC	EPBC	NatureMap 10km	MCPL 2015	MCPL 2019	MCPL 2020	MCPL 2022
Stylidiaceae	*Levenhookia pusilla*				x	x			x
	Levenhookia stipitata								x
	Stylidium aceratum (P3)	P3			x				
	Stylidium amoenum				x	x	x	x	x
	Stylidium androsaceum				x				
	Stylidium brunonianum						x		
	Stylidium bulbiliferum								x
	Stylidium carnosum				x				
	Stylidium ciliatum				x		x	x	
	Stylidium crassifolium				x				
	Stylidium diuroides subsp. *diuroides*				x				
	Stylidium hispidum				x				x
	Stylidium ireneae (P4)	P4			x				
	Stylidium korijekup (P2)	P2			x				
	Stylidium lineatum				x				
	Stylidium piliferum					x	x	x	x
	Stylidium repens					x	x	x	x
	Stylidium rhynchocarpum				x				
	Stylidium schoenoides				x				
	Stylidium sp.					x	x	x	x
Thymelaeaceae	*Pimelea ciliata* subsp. *ciliata*				x				
	Pimelea rara (P4)	P4			x				
	Pimelea suaveolens					x	x	x	
	Pimelea suaveolens subsp. *suaveolens*				x				
	Pimelea sylvestris				x				
	Pimelea sp.					x	x	x	x
Violaceae	*Hybanthus debilissimus*				x				
Xanthorrhoeaceae	*Xanthorrhoea gracilis*				x	x	x	x	x
	Xanthorrhoea preissii				x	x	x	x	x
	Xanthorrhoea sp.						x		x
Xyridaceae	*Xyris lacera*				x				
	Xyris atriviridis				x				
Zamiaceae	*Macrozamia riedlei*				x	x	x	x	x

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE WILLOWDALE LAREGO SURVEY AREAS

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren. 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	Low DBCA records in close proximity of the area. As no granites in area likelihood reduced.
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: 8	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: 26	Low Has not been recorded by DBCA or by MCPL previously within the survey area
Drakaea elastica	Orchidaceae	T	Endangered	Habit: Tuberous, perennial, herb, 0.12-0.3 m high. Flower colour: red, green, yellow Flowering period (indicated in green): J F M A M J J A S **O** **N** D Soils: White or grey sand, low-lying situations adjoiing winter-wet swamps. IBRA Distribution: SWA Florabase records: 18	Low Has not been recorded by DBCA or by MCPL previously within the survey area, occurs on Swan Coastal Plain

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE WILLOWDALE LAREGO SURVEY AREAS

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren. 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
Eleocharis keigheryi	Cyperaceae	T	Vulnerable	Habit: Rhizomatous, clumped perennial, grass like or herb Flower colour: green Flowering period (indicated in green): J F M A M J J **A S O N** D Soils: Clay and sandy-loam emergent in freshwater IBRA Distribution: AVW GES, JAF, SWA Florabase records: 57	Low Has not been recorded by DBCA or by MCPL previously within the survey area, suitable habitat not present
Morelotia australiensis	Cyperaceae	T	Vulnerable	Habit: Rhizomatous, tufted perennial, grass-like or herb (sedge), to 1m high. Flower colour: brown Flowering period (indicated in green): J F M A M J J A S O **N D** Soils: - IBRA Distribution: JAF, SCP Florabase records: 46	Moderate Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area
Synaphea sp. Fairbridge Farm (D. Papenfus 696)	Proteaceae	T	Critically Endangered	Habit: Dense, clumped shrub, to 0.3m high, to 0.4m wide. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S **O** N D Soils: Sandy with lateritic pebbles. Near winter wet flats, in low woodland with weedy grasses. IBRA Distribution: SCP, JAF Florabase records: 31	Low Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area Occurs on Swan Coastal Plain.

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE WILLOWDALE LAREGO SURVEY AREAS

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren. 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
Synaphea sp. Pinjarra Plain (A.S. George 17182))	Proteaceae	T	Endangered	Habit: Erect, clumped shrub (sub-shrub), to 0.8m 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 or clay, grey-brown clayey sand, brown clayey loam, laterite. Flats, seasonally wet areas, railroad reserves often with wet depressions or drains. IBRA Distribution: SCP Florabase records: 63	Low Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area. Occurs on Swan Coastal Plain.
Synaphea sp. Serpentine (G.R. Brand 103)	Proteaceae	T	Critically Endangered	Habit: - Flower colour: - Flowering period (indicated in green): J F M A M J J A S O N D Soils: - IBRA Distribution: SCP Florabase records: 38	Low Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area. Occurs on Swan Coastal Plain.
Synaphea stenoloba	Proteaceae	T	Endangered	Habit: Caespitose shrub, 0.3-0.45m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A S O** N D Soils: Sandy or sandy clay soils. Winter-wet flats, granite. IBRA Distribution: SCP Florabase records: 52	Low Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area. Occurs on Swan Coastal Plain.

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE WILLOWDALE LAREGO SURVEY AREAS

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren. 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
Caladenia uliginosa subsp. *patulens*	Orchidaceae	P1	-	Habit: Tuberous, perennial, herb, 0.2-0.35m high. Flower colour: green-cream Flowering period (indicated in green): J F M A M J J A **S** **O** N D Soils: Clay loam and gravel. Well drained soils amongst dense shrubs. IBRA Distribution: JAF, SCP Florabase records: 42	Low Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area
Grevillea bipinnatifida subsp. *pagna*	Proteaceae	P1	-	Habit: Prostrate, lignotuberous shrub, 0.2-0.7m high. Flower colour: red & orange & yellow Flowering period (indicated in green): J F M A M J J **A** S **O** **N** D Soils: Grey sandy clay and loam, ironstone. Seasonal wetlands, swamps and roadsides. IBRA Distribution: SPC Florabase records: 13	Low Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area
Netrostylis sp. Nannup (P.A. Jurjevich 1133)	Fabaceae	P1	-	Habit: - Flower colour: - Flowering period (indicated in green): J F M A M J J A S O N D Soils: - IBRA Distribution: JAF Florabase records: 6	Low Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area
Synaphea odocoileops	Proteaceae	P1	-	Habit: Tufted, compact shrub, 0.2-0.5m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A** **S** **O** N D Soils: Brown-orange loam & sandy clay, granite. Swamps, winter-wet areas. IBRA Distribution: SCP Florabase records: 22	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 WILLOWDALE LAREGO SURVEY AREAS

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren. 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
Cardamine paucijuga	Brassicaceae	P2	-	Habit: Slender erect annual, herb, to 0.4m high. Flower colour: white Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: In moist to dry habitats. IBRA Distribution: JAF, SCP, WAR Florabase records: 10	Low Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area
Grevillea ornithopoda	Proteaceae	P2	-	Habit: Spreading, virgate shrub, 1-3(-5)m high, up to 3m wide. Flower colour: - Flowering period (indicated in green): J F M A M J J A **S O N** D Soils: - IBRA Distribution: JAF, SCP Florabase records: 16	Low Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area
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: 21	Low Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area
Millotia tenuifolia var. *laevis*	Asteraceae	P2	-	Habit: Ascending to erect annual, herb, 0.02-0.1m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: Granite or laterite soils. IBRA Distribution: SCP, JAF, AVW Florabase records: 13	Low Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area. Associated with Darling Scarp.

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE WILLOWDALE LAREGO SURVEY AREAS

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Schizaea rupestris	Asteraceae	P2	-	Habit: Rhizomatous, perennial, herb or grass-like or (fern), 0.1-0.2 m high, fronds simple, glossy; sporangia-bearing segments in pinnately arranged `cock's comb'. Flower colour: - Flowering period (indicated in green): J F M A M J J A S O N D Soils: Sand , gullies, creek banks shaded moist rock faces. IBRA Distribution: WAR, JAF, ESP Florabase records: 13	Low Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area
Stylidium korijekup	Stylidiaceae	P2	-	Habit: Perennial herb 0.18-0.34m high. Flower colour: - Flowering period (indicated in green): J F M A M J J A S O N D Soils: Well-drained grey-brown sandy loam with laterite. Upland ridges. IBRA Distribution: JAF, SCP Florabase records: 4	Low Occurs on the proposed site soil profile, however has not been recorded by DBCA or by MCPL previously within the survey area
Actinotus repens	Apiaceae	P3	-	Habit: - Flower colour: - Flowering period (indicated in green): J F M A M J J A S O N D Soils: - IBRA Distribution: WAR, JAF Florabase records: 33	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 WILLOWDALE LAREGO SURVEY AREAS

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren. 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
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: 29	Low Has not been previously recorded within the survey site. This species does not occur on the soil types/ landforms within the survey area.
Chamaescilla gibsonii	Hemerocallidaceae	P3	-	Habit: Clumped, tuberous herb. Flower colour: blue Flowering period (indicated in green): J F M A M J J A **S** O N D Soils: Clay to sandy clay. Winter-wet flats, shallow water-filled claypans. IBRA Distribution: JAF, SCP, WAR Florabase records: 28	Low Has not been previously recorded within the survey site. This species does not occur on the soil types/ landforms within 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 in creeklines.
Grevillea prominens	Proteaceae	P3	-	Habit: Spreading shrub, 0.5-1.7m high, 0.3-1m wide. Flower colour: cream-white Flowering period (indicated in green): J F M A M J J A **S O** N D Soils: Gravelly loam. Along creeklines. IBRA Distribution: JAF Florabase records: 9	Moderate Recorded in Dwellingup townsite.

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE WILLOWDALE LAREGO SURVEY AREAS

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
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	Low Associated with soil types/ landforms not typically found within the survey site, although Previous DBCA records found East of Dwellingup; however only localised seasonally wet areas and granite outcrops not in survey area.
Olearia strigosa	Asteraceae	P3	-	Habit: Erect shrub, 0.5-1.5m high. Flower colour: blue-purple Flowering period (indicated in green): **J F M** A M J J A S O N **D** Soils: Sandy loam, open forest. IBRA Distribution: JAF, SCP Florabase records: 8	Low Has not been previously recorded within the survey site. This species does not occur on the soil types/ landforms within the survey area.
Stylidium aceratum	Stylidiaceae	P3	-	Habit: Fibrous rooted annual, herb, 0.05-0.09m high, leaves spathulate. Flower colour: pink/white Flowering period (indicated in green): J F M A M J J A S **O N** D Soils: Sandy soils, swamp heathland. IBRA Distribution: JAF, SCP, GES Florabase records: 27	Low Has not been previously recorded within the survey site. This species does not occur on the soil types/ landforms within the survey area.
Tetratheca parvifolia	Elaeocarpaceae	P3	-	Habit: Small shrub, 0.2-0.3m high. Flower colour: pink Flowering period (indicated in green): J F M A M J J A S **O** N D Soils: - IBRA Distribution: JAF, SCP Florabase records: 15	Low Has not been previously recorded within the survey site. This species does not occur on the soil types/ landforms within the survey area.

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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: 35	Low Typically found North of survey site in similar soil as the survey area, however has been previously recorded my MCPL (2019b)
Acacia flagelliformis	Fabaceae	P4	-	Habit: Rush-like, erect or sprawling shrub, 0.3-0.75m high. Flower colour: yellow Flowering period (indicated in green): J F M A **M J J A S** O N D Soils: Sandy soils. Winter-wet areas IBRA Distribution: JAF, SCP Florabase records: 36	Low Has not been previously recorded within the survey site. This species does not occur on the soil types/ landforms within the survey area.
Acacia oncinophylla subsp. *patulifolia*	Fabaceae	P4	-	Habit: Shrub, 0.5-2.5(-3), 'minni-ritchi' bark, phyllodes 4-9cm long, 3-6mm wide. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A S O N D** Soils: Granitic soils, occasionally on laterite. IBRA Distribution: JAF, SCP Florabase records: 31	Low Has not been previously recorded within the survey site. This species does not occur on the soil types/ landforms within the survey area.
Acacia semitrullata	Fabaceae	P4	-	Habit: Slender, erect, pungent shrub, (0.1-)0.2-0.7(-1.5)m high. Flower colour: cream-white Flowering period (indicated in green): J F M A **M J J A S O** N D Soils: White/grey sand, sometimes over laterite, clay. Sandplains, swampy areas. IBRA Distribution: JAF, SCP, WAR Florabase records: 88	Low Has not been previously recorded within the survey site.

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Caladenia speciosa	Orchidaceae	P4	-	Habit: Tuberous, perennial, herb, 0.35-0.6m high. Flower colour: white-pink Flowering period (indicated in green): J F M A M J J A **S** **O** N D Soils: White, grey or black sand. IBRA Distribution: JAF, SCP Florabase records: 60	Low Not previously recorded and doesn't occur within the same soil type
Conostylis pauciflora subsp. *pauciflora*	Haemodoraceae	P4	-	Habit: Rhizomatous, stoloniferous perennial, grass-like or herb, 0.1-0.35m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A** **S** **O** N D Soils: Grey sand, limestone. Hillslopes, consolidated dunes. IBRA Distribution: SCP Florabase records: 14	Low Has not been previously recorded within the survey site. This species does not occur on the soil types/ landforms within the survey area.
Eucalyptus x graniticola	Myrtaceae	P4	-	Habit: Mallee to 4m Smooth bark. Flower colour: stamens cream. Flowering period (indicated in green): J F M A M J J A **S** **O** N D Soils: granite soils IBRA Distribution: JAF Florabase records: 5	Low Has not been recorded by DBCA or by MCPL previously within 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	Moderate - High Has not been recorded by DBCA or by MCPL previously within the survey area, however has been recorded south of Dwellingup, close to Linto Road.

APPENDIX C: ASSESSMENT OF POTENTIAL THREATENED AND PRIORITY FLORA IN THE WILLOWDALE LAREGO SURVEY AREAS

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren. 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
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	Moderate DBCA record close to Nanga Road, Dwellingup, 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: 45	High Previously recorded by MCPL over multiple years.
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: 27	Moderate Has not been recorded by DBCA or by MCPL previously within the survey area.

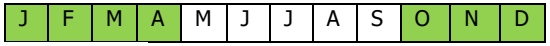
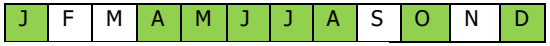
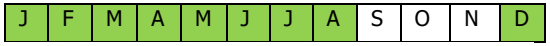
APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE LAREGO SURVEY AREAS

Note: WONS = Weeds of National Significance (Department of Agriculture, Water and the Environment 2020e); WAOL = Western Australian Organism List (Department of Primary Industries and Regional Development 2020). IBRA Distribution: AVW – Avon Wheatbelt; CAR – Carnarvon; CEK – Central Kimberley; COO – Coolgardie; DAL – Dampierland; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; GVD; Great Victoria Desert; HAM – Hampton; JAF – Jarrah Forest; MAL – Mallee; NOK – Northern Kimberley; NUL – Nullarbor; OVP – Ord Victoria Plain; PIL – Pilbara; SWA – Swan Coastal Plain; 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	Likelihood of Occurrence
**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
**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
**Briza maxima*	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: 176	High
**Callistemon citrinus*	No	Permitted - s11	-	-	-	Habit: Shrub 2-3m high, Flower colour: red Flowering period (indicated in green): J F M A M J J A S **O N** D Soils: Loam, sand, clay, laterite, road sides IBRA Distribution: SWA, JAF Florabase records: 3	Low

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE LAREGO SURVEY AREAS

Note: WONS = Weeds of National Significance (Department of Agriculture, Water and the Environment 2020e); WAOL = Western Australian Organism List (Department of Primary Industries and Regional Development 2020). IBRA Distribution: AVW – Avon Wheatbelt; CAR – Carnarvon; CEK – Central Kimberley; COO – Coolgardie; DAL – Dampierland; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; GVD; Great Victoria Desert; HAM – Hampton; JAF – Jarrah Forest; MAL – Mallee; NOK – Northern Kimberley; NUL – Nullarbor; OVP – Ord Victoria Plain; PIL – Pilbara; SWA – Swan Coastal Plain; 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	Likelihood of Occurrence
**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):  Soils: Damp habitats. IBRA Distribution: AVW, CER, COO, ESP, GAS, GES, GVD, HAM, JAF, MAL, OVP, SWA, WAR Florabase records: 110	Moderate
**Cotula coronopifolia*	No	Permitted - s11	-	-	-	Habit: Stoloniferous annual or perennial herb to 0.3m Flower colour: yellow Flowering period (indicated in green):  Soils: sand, granite, ironstone and laterite soils IBRA Distribution: AVW, ESP, GES, JAF, MAL, SWA, WAR Florabase records: 169	Low
**Erigeron sumatrensis*	No	Permitted - s11	-	-	-	Habit: Annual herb to about 2 m high Flower colour: cream Flowering period (indicated in green):  Soils: Weed of pasture, road sides, cultivation, and wasteland. Widespread. IBRA Distribution: AVW, COO, ESP, GES, JAF, MAL, SWA, WAR Florabase records: 109	Low

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE LAREGO SURVEY AREAS

Note: WONS = Weeds of National Significance (Department of Agriculture, Water and the Environment 2020e); WAOL = Western Australian Organism List (Department of Primary Industries and Regional Development 2020). IBRA Distribution: AVW – Avon Wheatbelt; CAR – Carnarvon; CEK – Central Kimberley; COO – Coolgardie; DAL – Dampierland; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; GVD; Great Victoria Desert; HAM – Hampton; JAF – Jarrah Forest; MAL – Mallee; NOK – Northern Kimberley; NUL – Nullarbor; OVP – Ord Victoria Plain; PIL – Pilbara; SWA – Swan Coastal Plain; 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	Likelihood of Occurrence
**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	Low
**Eucalyptus saligna*	No	Permitted - s11	-	-	-	Habit: Tree,75-12 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: Water courses, brown loam, granite, rocky loam. IBRA Distribution: JAF Florabase records: 8	Low
**Galium murale*	No	Permitted - s11	-	-	-	Habit: Erect, procumbent annual herb to 0.02-0.15mm high Flower colour: green-yellow-ceam Flowering period (indicated in green): J F M A M J J **A S O N D** Soils: Sandy soils, winter wet depressions, rocky run off areas and along drainage lines. IBRA Distribution: AVW, COO, ESP, GES, HAM, JAF, MAL. SWA, WAR Florabase records: 83	Low

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE LAREGO SURVEY AREAS

Note: WONS = Weeds of National Significance (Department of Agriculture, Water and the Environment 2020e); WAOL = Western Australian Organism List (Department of Primary Industries and Regional Development 2020). IBRA Distribution: AVW – Avon Wheatbelt; CAR – Carnarvon; CEK – Central Kimberley; COO – Coolgardie; DAL – Dampierland; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; GVD; Great Victoria Desert; HAM – Hampton; JAF – Jarrah Forest; MAL – Mallee; NOK – Northern Kimberley; NUL – Nullarbor; OVP – Ord Victoria Plain; PIL – Pilbara; SWA – Swan Coastal Plain; 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	Likelihood of Occurrence
**Hypericum perforatum*	No	Permitted - s11	-	-	-	Habit: Erect perennial, herb, 0.3-0.9m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O N D Soils: Roadside verges IBRA Distribution: AVW, CAR, JAF, WAR Florabase records: 9	Low
**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: 351	High
**Llilium candidum*	No	Permitted - s11	-	-	-	Habit: Bulbous herb 0.4 to 1.2m high. Flower colour: white Flowering period (indicated in green): J F M A M J J A S O N D Soils: Disturbed areas and watercourses IBRA Distribution: JAF, WAR Florabase records: 2	Low

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE LAREGO SURVEY AREAS

Note: WONS = Weeds of National Significance (Department of Agriculture, Water and the Environment 2020e); WAOL = Western Australian Organism List (Department of Primary Industries and Regional Development 2020). IBRA Distribution: AVW – Avon Wheatbelt; CAR – Carnarvon; CEK – Central Kimberley; COO – Coolgardie; DAL – Dampierland; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; GVD; Great Victoria Desert; HAM – Hampton; JAF – Jarrah Forest; MAL – Mallee; NOK – Northern Kimberley; NUL – Nullarbor; OVP – Ord Victoria Plain; PIL – Pilbara; SWA – Swan Coastal Plain; 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	Likelihood of Occurrence
**Lonicera japonica*	No	Permitted - s11	-	-	-	Habit: Vine 2-3m high Flower colour: Cream/white Flowering period (indicated in green): J F M A M J J A S **O N D** Soils: Loam to alluvial soils, watercourses and wetter areas IBRA Distribution: JAF, SWA, WAR Florabase records: 27	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: 362	Moderate
**Medicago polymorpha*	No	Permitted - s11	-	-	-	Habit: Prostrate to ascending annual herb, 0.04 to 0.2m high Flower colour: yellow Flowering period (indicated in green): **J F** M A **M** J **J A S O N** D Soils: sands, ironstone, gravels, clays and granite, largely disturbed areas. IBRA Distribution: AVW, CAR, COO, DAL, ESP, GES, JAF, MAL, MUR, NUL, PIL, SWA, WAR, YAL Florabase records: 114	Moderate

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE LAREGO SURVEY AREAS

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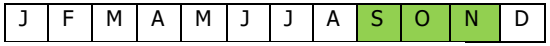
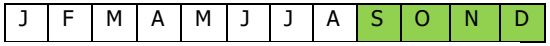
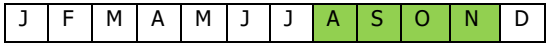
Species	WONS	WAOL legal status	WAOL Control Category	WAOL Control Category	Declared areas	Description and Habitat	Likelihood of Occurrence
**Melia azedarach*	No	Permitted - s11	-	-	-	Habit: Deciduous tree, 2 to 15m high Flower colour: white-pink-purple Flowering period (indicated in green):  Soils: sandstone and limestone, floodplains, ridges and gorges. IBRA Distribution: AVW, CEK, COO, DAL, JAF, NOK, OVP, PIL, SWA, VIB Florabase records: 56	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):  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	Low
**Oxalis corniculata*	No	Permitted - s11	-	-	-	Habit: Creeping annual, herb, 0.02-0.2 m high. Flower colour: yellow Flowering period (indicated in green):  Soils: A weed of lawns & gardens. IBRA Distribution: AVW, CEK, COO, DAL, ESP, JAF, MAL, PIL, SWA, VIB, WAR Florabase records: 40	Moderate

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE LAREGO SURVEY AREAS

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Species	WONS	WAOL legal status	WAOL Control Category	WAOL Control Category	Declared areas	Description and Habitat	Likelihood of Occurrence
**Oxalis glabra*	No	Permitted - s11	-	-	-	Habit: Slender bulbaceous, perennial, herb, 0.05-0.2 m high. Fl. pink-purple/red & yellow, May to Aug. Sand, clay, sandy clay, lateritic soils. Disturbed areas. 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	Moderate
**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	Moderate
**Phytolacca octandra*	No	Permitted - s11	-	-	-	Habit: Spreading, erect perennial, herb or shrub, 0.4 – 1.7m high. Flower colour: white-pink-red Soils: Sandy sandy-loam **J** **F** **M** A M J J A **S** O N **D** IBRA Distribution: AVW, COO, ESP, JAF, SWA, YAL Florabase records: 52	Moderate

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE LAREGO SURVEY AREAS

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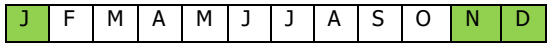
Species	WONS	WAOL legal status	WAOL Control Category	WAOL Control Category	Declared areas	Description and Habitat	Likelihood of Occurrence
**Pinus pinaster*	No	Permitted - s11	-	-	-	Habit: Tree or (conifer), 2-40 m high, monoecious; leaves in pairs, 15-30 cm long; cones with numerous scales; seeds winged. Flowering period (indicated in green): Soils: Sand, grey sandy clay, loam. Gentle slopes, edge of tracks, disturbed land. IBRA Distribution: AVW, JAF, SWA, Florabase records: 13	Moderate
**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): Soils: Near plantations. IBRA Distribution: AVW, JAF, SWA, WAR Florabase records: 9	Moderate
**Quercus palustris*	No	Permitted - s11	-	-	-	Habit: Slender suckering tree 4-6m Flower colour: Flowering period (indicated in green): Soils: Watercourses, clay loams IBRA Distribution: JAF Florabase records: 1	Low
**Rubus ulmifolius*	Yes	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):  Soils: Along creeks & drains. IBRA Distribution: JAF, SWA, WAR Florabase records: 45	Moderate

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE LAREGO SURVEY AREAS

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Species	WONS	WAOL legal status	WAOL Control Category	WAOL Control Category	Declared areas	Description and Habitat	Likelihood of Occurrence
**Senecio vulgaris*	No	Permitted - s11	-	-	-	Habit: Erect annual, herb, 0,05 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: Sandy soils, and in disturbed ground. IBRA Distribution: JAF, SWA, WAR Florabase records: 28	Moderate
**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: 429	High
**Syncarpia glomulifera*	No	Permitted - s11	-	-	-	Habit: Tree with furrowed bark. 10m high Flower colour: Flowering period (indicated in green): Soils: Watercourses IBRA Distribution: JAF Florabase records: 1	Low
**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: 315	High

APPENDIX D: ASSESSMENT OF POTENTIAL INTRODUCED (WEED) FLORA IN THE LAREGO SURVEY AREAS

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Species	WONS	WAOL legal status	WAOL Control Category	WAOL Control Category	Declared areas	Description and Habitat	Likelihood of Occurrence
**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: 160	Low
**Vinca major*	No	Permitted - s11	-	-	-	Habit: Creeping or scrambling perennial herb; 0.5m high Flower colour: blue Flowering period (indicated in green): J F M A M J J A S O N D Soils: Cultivated and disturbed area IBRA Distribution: JAF, SCP, WAR Florabase records: 34	Low
**Wahlenbergia capensis*	No	Permitted - s11	-	-	-	Habit: Slender erect or ascending annual herm 0.1-0.5m high Flower colour: blue/blue-greem Flowering period (indicated in green): J F M A M J J A S O N D Soils: Sandy soils. Disturbed area IBRA Distribution: AVW, ESP, GES, JAF, MAL, SWA, WAR Florabase records: 102	Low

APPENDIX E: SUMMARY OF SPECIES BY SITE-VEGETATION TYPE ON LAREGO SURVEY AREAS, 202

Note: * denotes intrdouced weed species and P3 and P4 indicated Priority 3 and Priority 4 species (DBCA 2007-)

	Species	Site-Vegetation Types														
		A	AC	CW	D	W	PW	SW	PS	PT	S	SP	ST	TP	TS	T
	Acacia alata	x	x	x	x	x					x				x	x
	Acacia divergens		x	x												
	Acacia drummondii subsp. *candolleana*						x		x		x	x	x			x
	Acacia drummondii subsp. *drummondii*								x						x	
	Acacia extensa	x		x												
	Acacia lateriticola			x		x	x		x	x	x			x	x	
	Acacia nervosa				x						x		x			
	Acacia pulchella				x	x		x	x	x	x	x	x	x	x	x
	Acacia saligna										x		x			
	Acacia urophylla				x						x	x	x		x	x
	Acacia willdenowiana					x					x					
	Adenanthos barbiger				x	x		x	x	x	x	x	x	x	x	x
	Agrostocrinum hirsutum			x							x					x
*	*Aira caryophyllea*					x										
	Allocasuarina fraseriana			x	x	x	x	x	x	x	x	x	x	x	x	x
	Amphipogon amphipogonoides							x	x		x		x		x	
	Andersonia latiflora										x					
	Anigozanthos sp.						x									
	Astartea scoparia	x	x	x			x									
	Asteraceae sp.							x	x		x	x			x	
	Babingtonia camphorosmae			x	x	x	x	x			x					
	Banksia dallanneyi subsp. *dallanneyi* var. *dallanneyi*			x	x	x	x	x	x	x	x	x	x	x	x	x
	Banksia dallanneyi subsp. *sylvestris*										x					
	Banksia grandis				x	x	x	x	x	x	x		x		x	x
	Banksia littoralis		x	x												
	Banksia sessilis				x	x		x	x		x	x	x		x	
	Banksia sp.							x								
	Banksia sphaerocarpa				x											
	Billardiera ?fraseri												x			
	Billardiera floribunda			x												
	Billardiera fusiformis										x		x		x	
	Boronia crenulata			x	x	x			x	x	x		x		x	
	Boronia fastigiata		x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Borya sphaerocephala			x												
	Bossiaea aquifolium	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Bossiaea ornata					x		x	x		x	x			x	x
*	*Briza maxima*					x										
	Burchardia congesta								x		x	x				
	Caladenia latifolia						x				x				x	
	Caladenia reptans												x			
	Caladenia sp.					x		x	x		x		x		x	x
	Calothamnus sp.				x											
	Calytrix sp.					x		x	x		x	x	x			x
	Cassytha glabella			x									x			
	Cassytha sp.		x	x												
*	*Centaurium erythraea*					x										x
	Chamaescilla corymbosa		x	x		x	x	x	x	x	x	x	x	x	x	x
	Chorizema cordatum			x						x						
	Clematis pubescens					x				x				x	x	x

APPENDIX E: SUMMARY OF SPECIES BY SITE-VEGETATION TYPE ON LAREGO SURVEY AREAS, 202

Note: * denotes intrdouced weed species and P3 and P4 indicated Priority 3 and Priority 4 species (DBCA 2007-)

Species	Site-Vegetation Types														
	A	AC	CW	D	W	PW	SW	PS	PT	S	SP	ST	TP	TS	T
Comesperma ?calymega												x			
Comesperma virgatum			x		x		x	x		x	x	x		x	x
Conospermum flexuosum subsp. *laevigatum*						x		x		x					
Conospermum stoechadis				x											
Conostylis pusilla					x			x		x					
Conostylis serrulata							x	x		x	x	x		x	x
Conostylis setigera				x	x	x	x	x	x	x	x	x	x	x	
Conostylis setosa					x					x					
Corymbia calophylla	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cryptostylis ovata														x	x
Cyathochaeta ?avenacea			x												
Cyperaceae sp.				x	x										
Dampiera linearis		x													
Desmocladus fasciculatus			x		x		x	x	x	x		x	x	x	
Desmocladus flexuosus					x		x	x		x	x			x	x
Diuris sp.								x		x				x	
Drosera sp.			x	x	x	x	x	x	x	x	x	x	x	x	x
Eucalyptus marginata		x	x	x	x	x	x	x	x	x	x	x	x	x	x
Eucalyptus megacarpa		x	x		x							x			
Eucalyptus patens	x	x	x		x	x				x					
Eucalyptus rudis		x	x												
Fabaceae sp.															x
Gahnia decomposita		x	x												
Gastrolobium spinosum							x			x					
Glischrocaryon aureum												x			
Gompholobium knightianum			x												
Gompholobium marginatum										x					
Gompholobium preissii								x							
Gompholobium sp.			x												
Goodeniaceae sp.															x
Grevillea diversifolia			x	x	x										
Grevillea wilsonii								x							
Grevillea prominens (P3)										x					
Haemodorum laxum										x					
Haemodorum sp.								x		x					
Hakea amplexicaulis		x	x	x	x	x	x	x	x	x	x	x	x	x	x
Hakea incrassata										x					
Hakea lissocarpha								x				x			
Hakea prostrata				x						x					
Hakea ruscifolia								x		x					
Hemiandra pungens							x	x							
Hemigenia pritzelii			x	x	x	x	x	x	x	x	x	x	x	x	
Hibbertia amplexicaulis			x	x	x	x	x	x	x	x	x	x	x	x	x
Hibbertia commutata				x	x			x	x	x	x	x	x	x	x
Hibbertia glomerata subsp*. glomerata*							x	x		x	x				
Hibbertia hypericoides										x					x
Hibbertia lasiopus										x		x			x
Hibbertia sp.							x		x	x		x			
Hibbertia subvaginata										x					

APPENDIX E: SUMMARY OF SPECIES BY SITE-VEGETATION TYPE ON LAREGO SURVEY AREAS, 202

Note: * denotes intrdouced weed species and P3 and P4 indicated Priority 3 and Priority 4 species (DBCA 2007-)

	Species	Site-Vegetation Types														
		A	AC	CW	D	W	PW	SW	PS	PT	S	SP	ST	TP	TS	T
	Hovea chorizemifolia				x	x		x	x		x	x	x		x	x
	Hovea sp.															x
	Hyalosperma cotula					x									x	
	Hypocalymma angustifolium			x	x	x	x	x	x		x					x
	Hypocalymma cordifolium		x	x		x										
	Hypocalymma robustum			x								x				
*	*Hypochaeris glabra*										x		x		x	
	Hypolaena exsulca				x	x		x			x				x	
	Iridaceae sp.														x	
	Isotoma hypocrateriformis					x										
	Johnsonia lupulina										x					
	Kennedia coccinea										x					
	Kennedia prostrata												x			
	Labichea punctata								x						x	
	Lagenophora huegelii			x	x	x	x	x	x	x	x	x	x	x	x	x
	Lasiopetalum floribundum		x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Lasiopetalum glabratum										x				x	
	Lechenaultia biloba				x	x		x	x		x	x	x		x	
	Lepidosperma gracile				x	x	x		x		x				x	
	Lepidosperma pubisquameum								x							
	Lepidosperma sp.			x		x	x		x			x	x		x	
	Lepidosperma squamatum										x					
	Lepidosperma tetraquetrum			x		x										
	Leptomeria cunninghamii					x			x	x	x			x	x	x
	Leptospermum erubescens										x				x	
	Leucopogon australis												x			x
	Leucopogon capitellatus					x					x				x	x
	Leucopogon glabellus							x	x		x					
	Leucopogon sp.										x		x			
	Leucopogon verticillatus				x		x		x	x	x	x	x	x	x	x
	Levenhookia pusilla					x					x		x			x
	Levenhookia stipitata							x								
	Lindsaea linearis			x												
	Lobelia sp.				x											
	Lomandra brittanii										x					x
	Lomandra caespitosa		x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Lomandra hermaphrodita				x	x	x		x	x	x	x	x	x	x	x
	Lomandra micrantha					x					x					
	Lomandra micrantha subsp. *micrantha*						x	x	x	x	x	x	x	x	x	x
	Lomandra nigricans					x			x		x	x	x		x	x
	Lomandra preissii															x
	Lomandra purpurea										x	x				
	Lomandra sericea				x	x	x	x	x		x	x	x		x	x
	Lomandra sonderi				x	x	x	x	x	x	x	x	x	x	x	x
	Lomandra sp.		x	x		x	x	x	x	x	x	x	x	x	x	x
	Lomandra spartea					x	x	x	x	x	x	x	x	x	x	x
	Loxocarya cinerea					x			x		x					
	Lysiandra calycina				x	x	x	x	x	x	x	x	x	x	x	x
	Macrozamia riedlei			x	x	x	x	x	x	x	x	x	x	x	x	x

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Note: * denotes intrdouced weed species and P3 and P4 indicated Priority 3 and Priority 4 species (DBCA 2007-)

	Species	Site-Vegetation Types														
		A	AC	CW	D	W	PW	SW	PS	PT	S	SP	ST	TP	TS	T
	Melaleuca preissiana	x	x		x		x									
	Mirbelia dilatata	x	x	x		x					x	x				
	Myrtaceae sp.										x					
	Netrostylis sp. Jarrah Forest (R. Davis 7391)		x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Neurachne alopecuroidea					x			x		x		x		x	x
	Opercularia apiciflora										x				x	
	Opercularia echinocephala		x	x	x	x	x		x	x	x	x	x	x	x	x
	Opercularia hispidula					x							x		x	
	Opercularia sp.										x		x			
	Orchidaceae sp.		x	x	x	x		x	x		x	x	x		x	x
	Paraserianthes lophantha						x				x					
	Patersonia babianoides										x					
	Patersonia occidentalis				x	x	x	x	x		x		x		x	x
	Patersonia pygmaea							x			x					
	Patersonia rudis						x				x		x		x	
	Patersonia sp.										x					x
	Pentapeltis peltigera				x	x	x	x	x		x		x		x	x
	Pericalymma ellipticum				x	x					x					
	Persoonia elliptica										x		x		x	x
	Persoonia longifolia				x	x	x	x	x	x	x		x	x	x	x
	Philotheca spicata						x				x					
	Pimelea sp.												x			
	Pittosporaceae sp.								x		x					
	Platysace compressa		x	x	x	x	x		x	x	x	x	x	x	x	x
	Platysace filiformis			x		x			x	x	x		x	x	x	x
	Platysace sp.								x							
	Platysace tenuissima			x	x	x			x		x		x		x	x
	Poaceae sp.							x	x		x				x	x
	Pterdium esculentum		x	x	x	x				x	x		x	x	x	x
	Pterochaeta paniculata					x			x		x				x	
	Pterostylis sp.			x		x		x	x	x	x	x	x	x	x	x
	Pterostylis vittata										x		x			
	Pyrorchis nigricans					x			x		x				x	
	Restionaceae sp.												x			
	Rytidosperma caespitosum			x		x		x	x		x	x	x		x	x
	Rytidosperma sp.					x	x								x	
	Rytidosperma acerosum														x	
	Scaevola calliptera						x				x				x	
	Senecio diaschides							x			x					x
	Senecio hispidulus							x	x	x	x	x	x	x	x	x
	Senecio leucoglossus (P4)														x	x
	Senecio quadridentatus															x
	Senecio sp.								x	x	x		x	x	x	x
*	*Senecio vulgaris*							x			x				x	x
*	*Sonchus oleaceus*								x							
	Sphaerolobium medium				x		x		x		x		x		x	
	Stachystemon vermicularis				x											
	Stackhousia monogyna				x			x		x			x	x	x	
	Stylidium amoenum			x	x	x	x	x	x	x	x	x	x	x	x	x

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	Species	Site-Vegetation Types														
		A	AC	CW	D	W	PW	SW	PS	PT	S	SP	ST	TP	TS	T
	Stylidium bulbiferum						x									x
	Stylidium hispidum					x									x	
	Stylidium piliferum							x	x		x	x			x	x
	Stylidium repens						x				x					
	Stylidium sp.								x		x		x			
	Stylphelia discolor				x		x			x	x		x	x	x	x
	Stylphelia nitens					x		x			x					
	Stylphelia pallida				x						x				x	x
	Stylphelia propinqua				x	x		x	x		x				x	x
	Stylphelia sp.										x					
	Stylphelia tenuiflora				x			x	x		x					
	Taxandria linearifolia		x	x			x		x							
	Tetrarrhena laevis			x		x			x	x	x		x	x	x	x
	Tetratheca hirsuta			x					x		x	x				
	Thomasia paniculata		x	x		x										
	Thysanostus dichotomus														x	
	Thysanotus fastigiatus								x		x	x	x			
	Thysanotus multiflorus					x			x		x					x
	Thysanotus thyrsoideus										x		x			
	Trachymene pilosa				x	x			x		x		x		x	x
	Trichocline spathulata			x	x	x			x	x	x	x	x		x	x
	Tripterococcus brunonis							x								
	Trymalium ledifolium	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	*Trymalium odoratissimum s*ubsp. *odoratissimum*		x			x				x			x			
*	*Wahlenbergia capensis*															x
	Wahlenbergia preissii														x	x
	Xanthorhoea sp.												x			
	Xanthorrhoea gracilis			x	x	x		x	x	x	x	x	x	x	x	x
	Xanthorrhoea preissii			x		x		x	x		x				x	x
	Xanthosia atkinsoniana						x	x	x		x		x		x	x
	Xanthosia candida					x	x	x	x		x	x	x		x	x
	Xanthosia huegelii										x					
	Xanthosia singuliflora								x		x				x	
	Xanthosia sp.												x			