

FLORA AND VEGETATION SURVEY

Stages 13E and 13G, Dalyellup Beach estate



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REPORT

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1 INTRODUCTION

Dalyellup Beach estate is an award-winning master-planned residential community located approximately ten kilometres south-west of Bunbury, in the Shire of Capel (Figure A).

Developed as a project between the Department of Housing and Works (now the Department of Communities (DoC)) and Satterley Property Group, the population of Dalyellup had grown to almost 9,000 by the 2016 census (ABS 2017).

1.1 Background

The Dalyellup area is zoned urban under the Greater Bunbury Regional Scheme and the study area is zoned 'Urban Development' under the Shire of Capel District Town Planning Scheme. The Dalyellup Beach Local Estate Structure Plan was endorsed by the WA Planning Commission in 1999. Satterley Property Group and DoC intend to further develop the community at Dalyellup and commissioned RPS AAP Consulting Pty Ltd (RPS) to undertake botanical investigations to support environmental approvals to undertake further urban development. This is an extension of development between completed stages to the north and west, and the coast, and the botanical investigation may influence the design of the development.

RPS understands that the outcomes of the survey will support an *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) referral of the project to the Commonwealth Department of Agriculture, Water and Environment (DAWE), subject to survey outcomes.

1.2 Scope of work

RPS was employed to undertake a primary spring flora and vegetation survey in accordance with the requirements for a detailed flora and vegetation survey in the Environmental Protection Authority's (EPA) *Technical Guidance: Flora and vegetation surveys for environmental impact assessment* (EPA, 2016), with the option of conducting a secondary survey if it was deemed necessary following regulatory comments on the EPBC referral. This structure was chosen to meet the time frame for submission of the EPBC referral.

The spring survey included an assessment of the potential presence of any rare flora or Threatened Ecological Communities (TECs). More specifically, the objectives of the flora and vegetation assessment are to:

- Identify any environmental constraints relating to flora and vegetation occurring within the survey area.
- Identify and characterise the flora and vegetation within the survey area.
- Identify the presence and extent of conservation significant flora and ecological communities that are currently listed under the *WA Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth EPBC Act within the survey area.
- Map the location and extent of significant flora and significant vegetation within the survey area.
- Undertake analysis and reporting of the significance of flora and vegetation in local, regional and state contexts.

1.3 Study area

The study area comprises approximately 14.5 hectares in the Dalyellup Beach estate and includes both disturbed and undisturbed portions of the project area (Figure A). The study area covers Stages 13E, Lots 3266–3304, and 13G Lots 3326–80 of the Coastal Subdivision Concept Plan, Dalyellup.

2 LEGISLATIVE CONTEXT

The protection of flora and vegetation in Western Australia is principally governed by three acts:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- State *Biodiversity Conservation Act 2016* (BC Act)
- State *Environmental Protection Act 1986* (EP Act).

The BC Act replaced the *Wildlife Conservation Act 1950* in 2019.

Each Act is discussed in more detail in the following sections.

2.1 Commonwealth

The EPBC Act is administered by the DAWE and provides for the listing of Threatened flora and TECs as Matters of National Environmental Significance (MNES). Under the EPBC Act, actions that have, or are likely to have, a significant impact on an MNES require approval from the Federal Minister for the Environment through a formal referral process.

Conservation categories applicable to Threatened flora species under the EPBC Act are:

- Extinct (EX) – there is no reasonable doubt that the last individual has died
- Extinct in the Wild (EW) – taxa known to survive only in captivity
- Critically Endangered (CR) – taxa facing an extremely high risk of extinction in the wild in the immediate future
- Endangered (EN) – taxa facing a very high risk of extinction in the wild in the near future
- Vulnerable (VU) – taxa facing a high risk of extinction in the wild in the medium-term
- Conservation Dependent (CD) – taxa whose survival depends upon ongoing conservation measures; without these measures, a conservation dependent taxon would be classified as Vulnerable, Endangered or Critically Endangered.

Ecological communities are defined as ‘naturally occurring biological assemblages that occur in a particular type of habitat’ (English & Blyth 1997). There are three categories under which ecological communities can be listed as TECs under the EPBC Act: Critically Endangered, Endangered and Vulnerable.

2.2 State

2.2.1 Conservation significant species

The BC Act provides for the listing of Threatened flora and species in the following categories:

- Critically Endangered (CR) – species facing an extremely high risk of extinction in the wild in the immediate future
- Endangered (EN) – species facing a very high risk of extinction in the wild in the near future
- Vulnerable (VU) – species facing a high risk of extinction in the wild in the medium-term future.

Species may also be listed as specially protected (SP) under the BC Act in one or more of the following categories:

- Species of special conservation interest – species with a naturally low population, restricted natural range, of special interest to science, or subject to or recovering from a significant population decline or reduction in natural range
- Species otherwise in need of special protection (OS).

The state Department of Biodiversity, Conservation and Attractions (DBCA) administers the BC Act and also maintains a non-statutory list of Priority flora. Priority species are still considered to be of conservation significance, that is, they may be Threatened, but cannot be considered for listing under the BC Act until

there is adequate understanding of threat levels imposed on them. Species on the Priority flora list are assigned to one of four Priority (P) categories, P1 (highest)–P4 (lowest), based on the level of knowledge existing (Appendix A).

2.2.2 Threatened Ecological Communities

Similar to flora, the BC Act provides for the listing of TECs in the following categories:

- Critically Endangered – facing an extremely high risk of becoming eligible for listing as a collapsed ecological community in the immediate future
- Endangered – facing a very high risk of becoming eligible for listing as a collapsed ecological community in the near future
- Vulnerable – facing a high risk of becoming eligible for listing as a collapsed ecological community in the medium-term future.

The DBCA also maintains a non-statutory list of Priority Ecological Communities (PECs) These may become TECs in the future; however as with Priority species they are currently inadequately known or are not adequately defined. PECs are assigned to one of five categories, with Priority 1 (few occurrences, limited distribution) of highest concern and Priority 5 (not threatened, but subject to a conservation program) of lowest concern (Appendix A).

2.2.3 Other significant flora or vegetation

Flora and vegetation may be considered significant for a range of reasons other than listing as Threatened or Priority. The EPA Factor Guideline flora and Vegetation (EPA 2016a) lists the following factors:

- Flora may be significant for
 - Being locally endemic or associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems)
 - Being a new species or with anomalous features that indicate a potential new species
 - Representing the range of a species (particularly at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
 - Being unusual species, including restricted subspecies, varieties or naturally occurring hybrids
 - Having relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape
- Vegetation may be significant for:
 - Having a restricted distribution
 - Subject to a degree of historical impact from threatening processes
 - Having a role as a refuge
 - Providing an important function required to maintain ecological integrity of a significant ecosystem.

2.2.4 Environmentally Sensitive Areas

Under the EP Act the State Minister for Environment may declare by notice either a specified area of the state or a class of areas of the state to be Environmentally Sensitive Areas (ESAs).

ESAs are generally areas where the vegetation has high conservation value. Several types of areas are declared ESAs including:

- The area covered by vegetation within 50 metres (m) of Threatened flora, to the extent to which the vegetation is continuous with the vegetation in which the Threatened flora is located
- The area covered by a TEC
- A defined wetland (Ramsar wetlands, conservation category wetlands and nationally important wetlands) and the area within 50 m of the wetland
- Bush Forever sites.

2.2.5 Introduced species

Introduced flora (weeds) pose threats to biodiversity and natural values by successfully out-competing native species. A weed is considered to be a plant that requires some form of action to reduce its negative effects on the economy, the environment and human health or amenity. Of the approximately 3,207 species of introduced plants that have naturalised in Australia, about 500 taxa (species and genera) have been declared noxious or are under some form of legislative control in Australia. Most of the significant weeds in Australia have been introduced (DAWE 2017).

Management of some weed species is required under Commonwealth or state frameworks. Key classifications for significant introduced flora that are relevant to this report are:

- Declared Organism – the *Biosecurity and Agriculture Management Act 2007* (BAM Act), Section 22 makes provision for a plant taxon to be listed as a Declared organism in parts of, or the entire state.
- Weed of National Significance (WoNS) – high impact, established introduced flora causing major economic, environmental, social and/or cultural impacts in a number of states/territories, and which have strong potential for further spread (Australian Weeds Committee 2012). Management is required in accordance with Department of Primary Industries and Regional Development (DPIRD) guidelines for particular WoNS.

Throughout this report, introduced flora species are indicated with an asterisk.

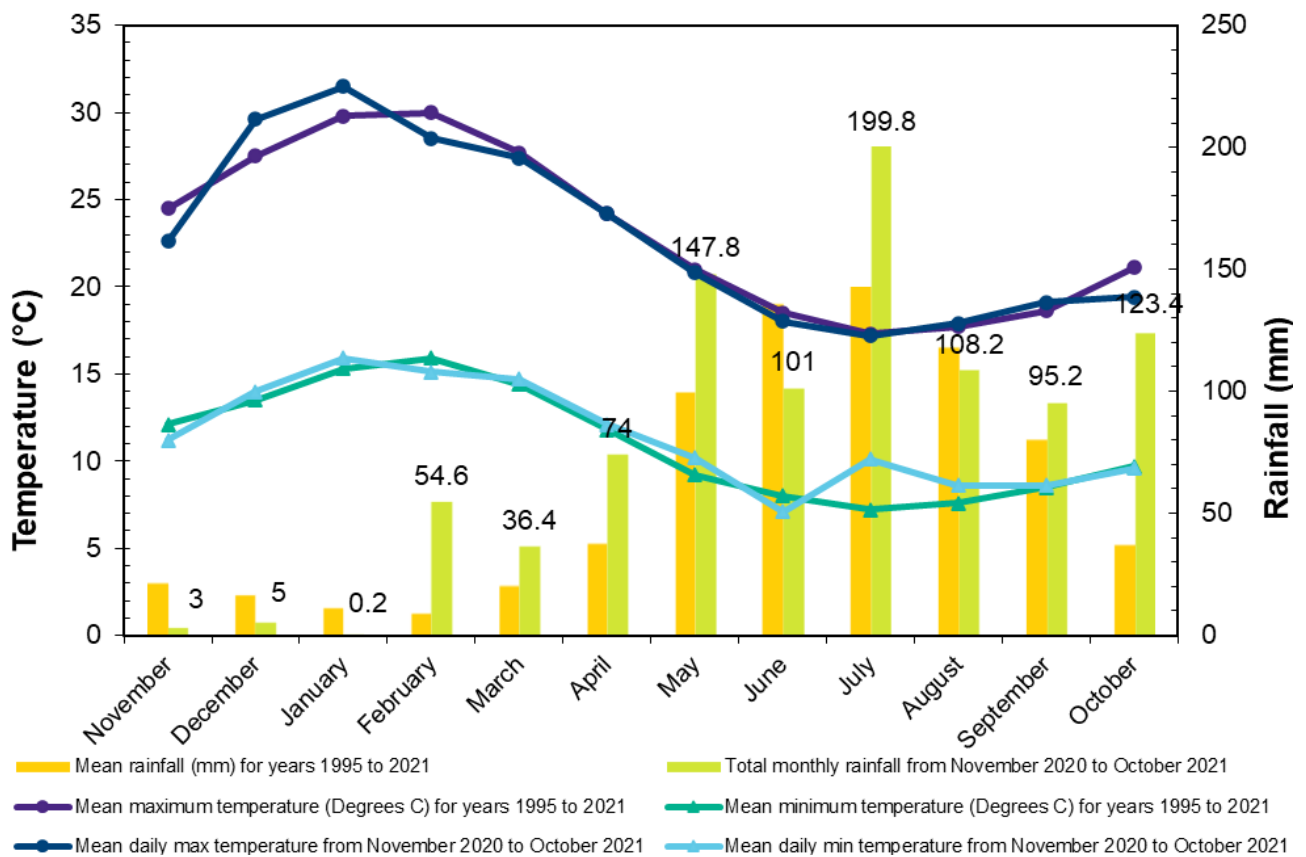
3 EXISTING ENVIRONMENT

3.1 Interim Biogeographic Regionalisation of Australia

The Interim Biogeographic Regionalisation of Australia (IBRA) has classified Australian landscapes into large ‘bioregions’ and ‘subregions’ dependent on climate, geology, landform, native vegetation and species information (DoEE 2016). The study area is located in the Perth subregion (SWA02) of the Swan Coastal Plain bioregion, which is characterised as comprised of colluvial and aeolian sands, alluvial river flats, and coastal limestone. Vegetation consists of tuart woodlands on limestone, Banksia and jarrah/Banksia woodlands on Quaternary marine dunes of various ages, and marri on colluvials and alluvials (Mitchell et al. 2002). The climate is Mediterranean, and the subregional area is approximately 1,333,900 hectares. The dominant land use in the Perth IBRA subregion is dry land agriculture (cultivation and grazing) with conservation, UCL and Crown reserves also common. Urban and rural residential is expanding in the region (Mitchell et al. 2002).

3.2 Climate and weather

The closest Bureau of Meteorology station is at Bunbury (No. 009965), approximately 11 km north-north-east of Dalyellup. Data from the 12 months prior to the survey shows that rainfall was above average in four of the previous six months, and temperatures showed slightly higher minima, and slightly higher maxima except in the month preceding the survey (Graph 1). These conditions indicate a good growing season and should allow for optimal plant growth.



Graph 1: Temperature and rainfall historical averages and records prior to survey (BoM, 2021)

3.3 Conservation reserves and ESAs

To the north of Dalyellup, in the City of Bunbury is the Kalgalup Regional Park. This new park encompasses several smaller reserves including the Shearwater (Usher Dalyellup) Tuart Forest to the north of Dalyellup Beach estate.

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Intersecting the study area to the south of Dalyellup Boulevard is Regional Open Space together with an Environmentally Sensitive Area, most likely associated with an occurrence of the state-listed TEC SCP18 'Shrublands on calcareous silts of the Swan Coastal Plain' (Figure B).

Various buffer zones of listed Priority and Threatened Ecological Communities also cover the study area (Figure D).

4 METHODS

4.1 Desktop review

Prior to the field component of the study, DBCA database searches were reviewed to gain an understanding of known conservation significant species and communities from the area. The *Threatened and Priority Flora database* and the Western Australian Herbarium database were searched for conservation significant flora in a 40 km radius of the study area (ref 20-01121FL), and the Threatened and Priority Communities database was searched for information on conservation significant communities within a 40 km radius of the study area (Ref 12_1121EC).

Previous studies in the area were also reviewed for information regarding species lists and vegetation mapping, specifically:

- A flora and vegetation survey along part of Dalyellup Boulevard (Ekologica 2012a)
- Vegetation Survey of the Proposed Tourist Precinct at Dalyellup (Ekologica 2012b)
- Report of a Level 1 Flora and Vegetation Survey at Dalyellup Beach (Ecoedge 2017)
- Kalgulup Regional Park management plan 96 2021 (DBCA, 2021).

The *Vegetation complexes of the Swan Coastal Plain* (DBCA 2018) dataset was consulted to provide context on current knowledge of the vegetation types in the study area.

The state-wide vegetation statistics (DBCA, 2019) were consulted to provide background to historical and current vegetation extents.

4.2 Field survey

4.2.1 Survey timing

Fieldwork was conducted from 16 to 18 November 2021 inclusive.

4.2.2 Flora and vegetation

Initially it was intended to establish permanent quadrats through the study area. However, the density of the vegetation at many of the sites and, at times, the steepness of the topography, resulted in 23 relevés being described instead due to the difficulties inherent in setting out tapes and marked corners (Figure C). At each site the following information was recorded

- A GPS point recording the centre of the relevé (GDA94 on Garmin GPS60 handheld unit)
- A digital photograph of the vegetation
- Topography
- Soil type
- A list of all species present
- Average heights and projected foliar cover of each species
- Vegetation description.

Location data was also captured on ArcGis Online using an iPad mini®.

Identifications were made in the field of taxa known to the surveying botanist, and collections were made of taxa not known or otherwise uncertain. These were pressed and dried and identified using the resources of the Western Australian Herbarium. Vegetation descriptions were made using the NVIS vegetation structure and height classes (NVIS, 2017) (Appendix A).

Field data was entered into an MS Access database and then analysed using Primer 7 (Clarke and Gorley, 2015) to produce a dendrogram of associated sites and vegetation types. For analysis, all annuals and singletons were removed from the spreadsheet to avoid 'noise'. Data was square root transformed and the Bray-Curtis similarity measure used to relate resemblance between vegetation types.

The resulting dendrogram was studied to understand the groupings, and description of vegetation types and vegetation mapping conducted based on these results.

To assess the survey effort, a species accumulation curve was produced during analysis.

4.2.2.1 Vegetation condition

Vegetation condition was assessed using the scale of Keighery (1994). This scale is the one recommended for use by the EPA (EPA, 2016) on the Swan Coastal Plain and covers six levels from Pristine to Completely Degraded, with emphasis placed on disturbance levels as an indicator of vegetation condition (Table 1).

Table 1: Keighery vegetation condition scale

Vegetation condition	Details
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
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.
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 very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing
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.
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 crop species with isolated native trees and shrubs.

4.2.3 Survey personnel

The survey was conducted by RPS' lead botanist Martin Henson. Martin has over 20 years' experience in botanical survey including many years on the Swan Coastal Plain. Collection licence FB62000110, expires 27 May 2022.

5 RESULTS

5.1 Desktop review

- *A flora and vegetation survey along part of Dalyellup Boulevard* (Ekologica, 2012a): Ekologica identified 47 taxa in an undefined area. Six vegetation types were described. No conservation significant taxa were recorded. The Gibson vegetation type describing the *Eucalyptus gomphocephala/Agonis flexuosa* was recorded but at this stage it was not considered conservation significant.
- *Vegetation Survey of the Proposed Tourist Precinct at Dalyellup* (Ekologica 2012b): Ekologica recorded 38 taxa on approximately 5.3 ha. No conservation significant flora were recorded, and seven vegetation types were described.
- *Report of a Level 1 Flora and Vegetation Survey at Dalyellup* (Ecoedge 2017): Ecoedge recorded 30 taxa over an approximately 23.15 ha study area, surveying in summer. No WoNS of Declared pest species were recorded. No conservation significant species were recorded, but one specimen of *Eremophila glabra* subsp. *albicans* was recorded. While not having a conservation ranking, this species at Dalyellup is at the south-western limit of its known range and may have conservation significance for this reason. Seven vegetation types were described.

A search of the DBCA Threatened and Priority Ecological Community database showed that the study area is either within the buffer zone of or containing the EPBC TEC *Tuart* (*Eucalyptus gomphocephala*) *woodlands and forest of the Swan Coastal Plain ecological community*. This community is a nationally listed community and occurs where there are multiple tuart trees with crowns separated by a distance of no more than 60 m (DoEE, 2019b). The DBCA describes it as “mostly confined to the Quindalup Dunes and Spearwood Dunes from Jurien Bay to the Sabina River with outliers along some rivers. Tuart is the key dominant canopy species however Tuart communities comprise a variety of flora and fauna assemblages. Flora commonly occurring with Tuart include Peppermint (*Agonis flexuosa*), *Banksia attenuata*, *Banksia grandis*, *Allocasuarina fraseriana*, *Xylomelum occidentale*, *Macrozamia riedlei*, *Xanthorrhoea preissii*, *Spyridium globulosum*, *Templetonia retusa* and *Dodonaea dampieri*” (DBCA, 2017).

Threatened and Priority flora and Western Australian Herbarium database searches did not show any records of conservation significant flora from the study area. The closest known conservation significant record is 1.01 km to the south-east of the study area. This record is of *Caladenia speciosa* (P4), for which no suitable habitat occurs in the study area.

DBCA (2018) describes the vegetation in the study area as the Quindalup Complex:

Coastal dune complex consisting mainly of two alliances - the strand and fore-dune alliance and the mobile and stable dune alliance. Local variations include the low closed forest of *Melaleuca lanceolata* (Rottnest Teatree) - *Callitris preissii* (Rottnest Island pine), the closed scrub of *Acacia rostellifera* (summer-scented wattle) and the low closed *Agonis flexuosa* (peppermint) forest of Geographe Bay.

The state-wide vegetation statistics (DBCA, 2019) define the vegetation of the study area as ‘Medium forest: jarrah-marri’. This description is inaccurate in the context of the vegetation at Dalyellup but is a function of a broader vegetation mapping exercise. The statistics indicate that there is 67.8% of the original extent of this vegetation left on the Swan Coastal Plain. Although this does not specifically refer to the vegetation types at Dalyellup it does give an indication of the overall status of that mapping unit. Over 26% of the remaining extent is held in conservation reserves.

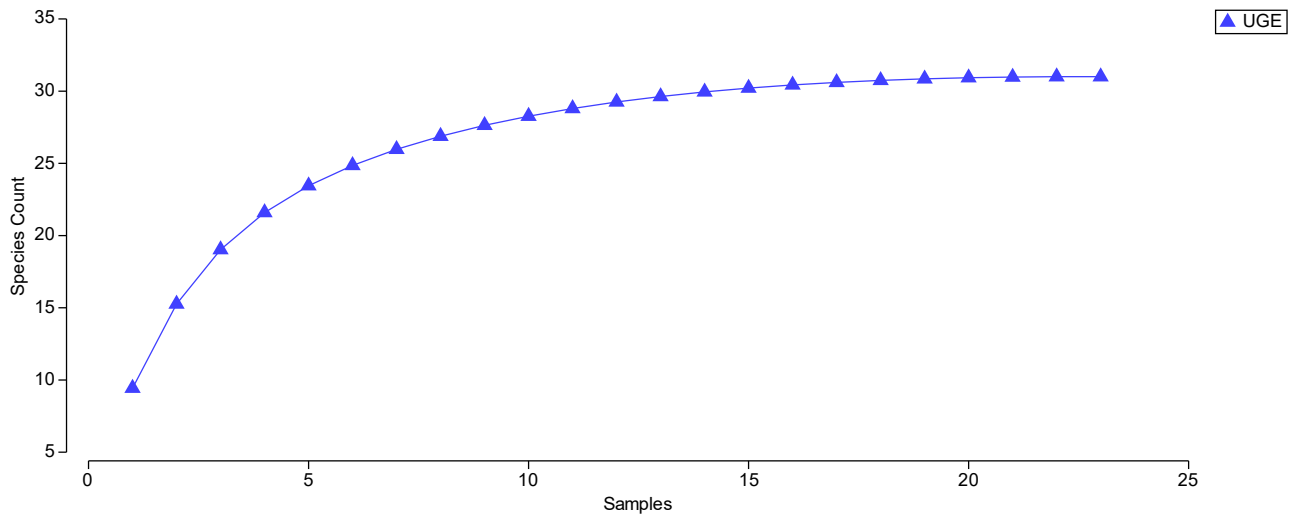
The *Kalgulup Regional Park management plan* (DBCA 2021) gives figures for the Quindalup Complex, citing a pre-European extent of 54,574 ha, with 32,293 ha (or 60.44%) remaining. A proportion of 8.37% of the pre-European extent is in conservation reserves, or 4,566 ha of the current extent, of which 1,295 ha is held in the Kalgurup Regional Park.

5.2 Field survey

5.2.1 Flora

Twenty-three relevés were described in the study area (Appendix B), with a total of 59 species recorded during the survey. Thirty-seven taxa were native and 22 were introduced (Appendix C).

A species accumulation curve was produced during the analysis (Graph 2). While this curve does not show the *r* value (correlation coefficient), the curve is flattening, and it can therefore be concluded that the majority of species in the study area have been recorded.



Graph 2: Species accumulation curve

The Poaceae were the most common family recorded with 11 species, followed by the Fabaceae (seven) and Asteraceae (six).

5.2.1.1 Introduced flora

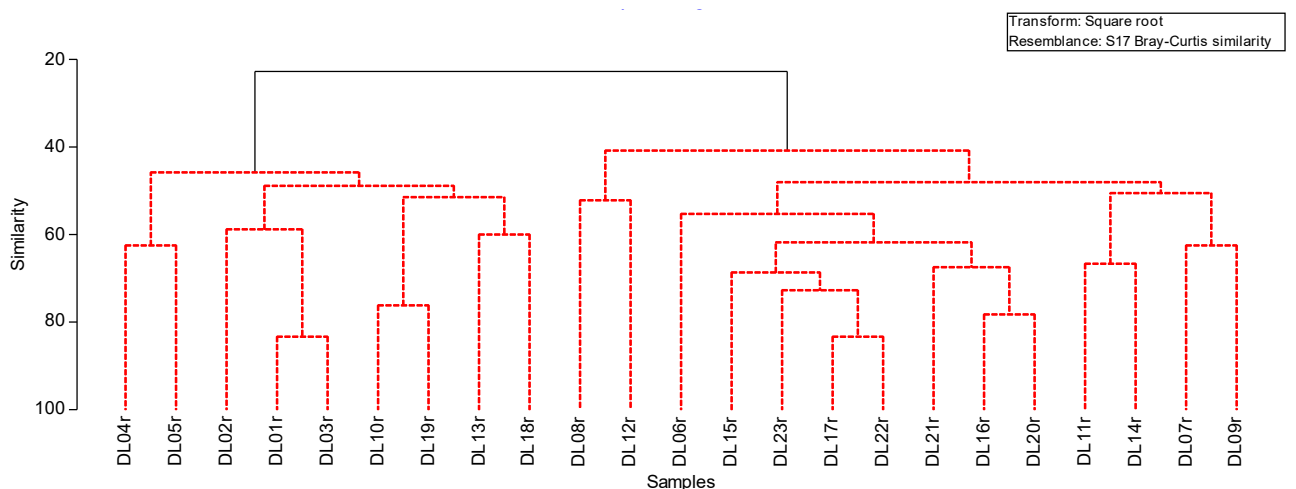
Twenty-two of the taxa recorded were introduced, eight of which were from the Poaceae family (grasses). None of these are WoNS or Declared Organisms (Section 2.2.5).

5.2.2 Vegetation

5.2.2.1 Results of primer analysis

The analysis and vegetation mapping produced eight vegetation types. The dendrogram (Graph 3) indicates that the vegetation is split into two broad associations. A species by site matrix, the basis for the PRIMER analysis, is included as Appendix D.

One of these is dominated by *Eucalyptus gomphocephala/Agonis flexuosa* (tuart association), and the other by *Acacia cochlearis* (acacia association). Within these two broader groups are vegetation types defined by smaller groupings.



Graph 3: Dendrogram of site classification

5.2.2.2 Vegetation types

Seven vegetation types were described from the results of the Primer analysis. These split into two broad types, a tuart grouping and an acacia grouping. There are also sites that have been placed in groupings that they do not appear to belong to and may be grouped that way because of the occurrence of non-dominant species. This may be a result indicating that, despite the initial placement of sites according to perceived vegetation types based on aerial photography, there is more variety within the vegetation than is apparent and it was not captured during the survey. This possibility is discussed in Section 6.3. Figure E maps the vegetation types.

5.2.2.3 Vegetation type descriptions

Sites DL04r and DL05r are classified separately from the other Tuart groups (<60% similarity). The factor defining this grouping is *Acacia rostellifera*, which is not found in any of the other Tuart association sites. Sites 4 and 5 are in an area that appears to have been revegetated because of the presence of irrigation in the sites. The vegetation type is:

EgAfArLg

Eucalyptus gomphocephala, *Agonis flexuosa*, *Acacia rostellifera* mid open to closed forest over *Spyridium globulosum* mid sparse shrubland over *Lepidosperma gladiatum* sparse sedgeland (Plate 1).



Plate 1: Vegetation type EgAfArLg

Other tuart association vegetation types are as follows.

EgAfHcLg

Sites DL02r, 03r and 01r

Eucalyptus gomphocephala, *Agonis flexuosa* mid closed forest over *Hibbertia cuneiformis* isolated shrubs over *Lepidosperma gladiatum* sedgeland (Plate 2).



Plate 2: Vegetation type EgAfHcLg

AfSgLg

Site DL18r

Site DL18r is grouped with others similar to itself in the dendrogram, although on the edge of the group. It is the only site that contained *Agonis flexuosa* without *Eucalyptus gomphocephala* and as such, while it was similar to the tuart association, it was not considered similar enough to be classified with the other tuart association vegetation types given that other stands of this composition occurred. For the purposes of vegetation mapping this site was excised and mapped separately to the others in its dendrogram branch.

Agonis flexuosa mid closed forest over *Spyridium globulosum* mid open shrubland over *Lepidosperma gladiatum* closed sedgeland (Plate 3).



Plate 3: Vegetation type AfSgLg

EgAfAbLg

Sites DL10r, 13r, 19r

Eucalyptus gomphocephala, *Agonis flexuosa* mid closed forest over *Alyxia buxifolia*, *Diplolaena dampieri* low shrubland to sparse shrubland over *Lepidosperma gladiatum* sedgeland to open sedgeland (Plate 4).



Plate 4: Vegetation type EgAfAbLg

The dendrogram shows three major groupings within the acacia association (<60% similarity);

AcDcLg

Sites DL08r, 12r

Acacia cochlearis, *Spyridium globulosum*, *Hibbertia cuneiformis* tall to mid (open) shrubland over *Lepidosperma gladiatum* isolated sedges



Plate 5: Vegetation type AcDcLg

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The two larger groups in the Acacia association share many of the same species. Descriptions created for these vegetation types are as follows.

AcDdAf

Sites DL07r, 09r, 11r, 14r

Acacia cochlearis, *Diplolaena dampieri*, *Hibbertia cuneiformis* mid shrubland over *Alyxia buxifolia* sparse low shrubs over *Austrostipa flavescens* sparse tussock grasses

AcSgAf

Sites DL 15r, 17r, 22r, 21r, 16r, 23r (outside survey area)

Acacia cochlearis, *Spyridium globulosum*, *Alyxia buxifolia* mid to low open shrubland over *Conostylis aculeata* low sparse forbs, *Austrostipa flavescens* sparse tussock grasses

Due to the difficulty of separating them with clarity from aerial photography due to their structural similarity these two vegetation types were combined into a single mapping unit:

AcSgDdAf

Sites DL07r, 09r, 11r, 14r, 15r, 16r, 17r, 22r, 21r, 23r (outside study area)

Acacia cochlearis, *Spyridium globulosum*, *Dodonaea dampieri* mid shrubland over *Alyxia buxifolia* low open shrubland to low sparse shrubs over *Conostylis aculeata* low sparse forbs, *Austrostipa flavescens* sparse tussock grasses (Plate 6, Plate 7).



Plate 6: Vegetation type AcSgDdAf



Plate 7: Vegetation type AcSgDdAf

Within the acacia association two sites (DL06r and DL20r) have been classified which also include *Eucalyptus gomphocephala* and *Agonis flexuosa*. It appears they have been drawn from the tuart association by the presence of *Acacia cochlearis* and possibly **Trachyandra divaricata* in the sites, a combination not otherwise found within the tuart association sites. DL20r was removed from the mapping as it was a tuart reference site outside the study area, leaving DL06r as an outlier to be mapped separately:

EgAfAcLg

DL06r

Eucalyptus gomphocephala, *Agonis flexuosa* mid closed forest over *Acacia cochlearis*, *Spyridium globulosum*, *Acacia rostellifera* mid shrubland over *Lepidosperma gladiatum* sparse shrubland, *Austrostipa flavescens* sparse tussock grasses (Plate 8).



Plate 8: Vegetation type EgAfAcLg

The areas covered by each of the vegetation types is given in Table 1

Table 2: Vegetation type areas

Code	Description	Area (ha)	% area
AcDcLg	<i>Acacia cochlearis</i> , <i>Spyridium globulosum</i> , <i>Hibbertia cuneiformis</i> tall to mid (open) shrubland over <i>Lepidosperma gladiatum</i> isolated sedges	0.23	1.58
AcSgDdAf	<i>Acacia cochlearis</i> , <i>Spyridium globulosum</i> , <i>Dodonaea dampieri</i> mid shrubland over <i>Alyxia buxifolia</i> low open shrubland to low sparse shrubs over <i>Conostylis aculeata</i> low sparse forbs, <i>Austrostipa flavescens</i> sparse tussock grasses	4.50	30.96
AfSgLg	<i>Agonis flexuosa</i> mid closed forest over <i>Spyridium globulosum</i> mid open shrubland over <i>Lepidosperma gladiatum</i> closed sedgeland	1.76	12.12
EgAfAbLg	<i>Eucalyptus gomphocephala</i> , <i>Agonis flexuosa</i> mid closed forest over <i>Alyxia buxifolia</i> , <i>Diplolaena dampieri</i> low shrubland to sparse shrubland over <i>Lepidosperma gladiatum</i> sedgeland to open sedgeland	4.5	31.03
EgAfAcLg	<i>Eucalyptus gomphocephala</i> , <i>Agonis flexuosa</i> mid closed forest over <i>Acacia cochlearis</i> , <i>Spyridium globulosum</i> , <i>Acacia rostellifera</i> mid shrubland over <i>Lepidosperma gladiatum</i> sparse shrubland, <i>Austrostipa flavescens</i> sparse tussock grasses	0.22	1.52
EgAfArLg	<i>Eucalyptus gomphocephala</i> , <i>Agonis flexuosa</i> , <i>Acacia rostellifera</i> mid open to closed forest over <i>Spyridium globulosum</i> mid sparse shrubland over <i>Lepidosperma gladiatum</i> sparse sedgeland	0.77	5.3
EgAfHcLg	<i>Eucalyptus gomphocephala</i> , <i>Agonis flexuosa</i> mid closed forest over <i>Hibbertia cuneiformis</i> isolated shrubs over <i>Lepidosperma gladiatum</i> sedgeland	2.53	17.49

5.2.2.4 Threatened and Priority Ecological Communities

Comparison of the vegetation type results to described Threatened and Priority Ecological Communities and using the Approved Conservation Advice (EPBC 1999) highlights the presence of the tuart association in the vegetation results. Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain ecological community is listed as a TEC under the EPBC Act 1999 (DAWE 2021). The description of the community is broad, as tuart communities can vary throughout their range and position in the landscape, with a variety of understoreys occurring. In the context of the study area, the understorey of peppermint is found on areas of increasing alkalinity (DoEE, 2019a). This TEC is listed as Critically Endangered due to disturbance for agriculture, mineral extraction and suburban development. Over 80% of the estimated original extent of the community has been cleared (DoEE 2019b).

While the BC Act allows for the declaration of Threatened Ecological Communities, the DBCA currently only keeps a list of Priority Ecological Communities. Number 21 on the list is the EPBC TEC, but also of relevance is No. 23 Southern Swan Coastal Plain *Eucalyptus gomphocephala* – *Agonis flexuosa* woodlands (floristic community type 25) (can be a component of the Endangered Banksia Woodlands of the Swan Coastal plain EPBC listed TEC or the Tuart woodlands and forests of the Swan Coastal Plains EPBC listed TEC). This is a Priority 3 listed PEC with features similar to those recorded at Dalyellup. The DBCA description of the PEC quoted earlier (Section 5.1) includes species such as *Agonis flexuosa*, *Spyridium globulosum*, *Templetonia retusa* and *Diplolaena dampieri*, all of which were recorded at in the tuart communities during this survey.

When mapped, the results of the DBCA database searches show that while the tuart vegetation types are in the buffer zones of known TEC records, the tuart communities of Dalyellup may not be recorded themselves (Figure D).

5.2.3 Vegetation condition

- Despite the number of introduced species being a significant proportion of the overall species list, the majority of the sites recorded were in Excellent condition.
- Sites DL01r, 02r, 03r, 07r, 08r, 10r, 11r, 13r, 14r, 15r, 16r, 17, 18r, 19r, 20r, 21r, 22r and 23r are all classified as Excellent.
- Sites DL06r, DL12r were classified as Very Good.
- Sites DL04r, 05r, 09r were classified as Good.

These rankings are given because while there were a large number of introduced species present, they did not generally form a large proportion of the overall foliar cover in each site. The structural layers of the vegetation were generally intact, except for sites DL04r and DL05r where the lower strata had been largely replaced by introduced species.

Table 3 shows the area of each vegetation condition type in the survey area. Vegetation condition is mapped in Figure F.

Table 3: Vegetation condition areas

Condition type	Area (ha)	% area
Excellent	13.071	90.02
Very Good	0.944	6.50
Good	0.506	3.48
Degraded	0	0
Completely Degraded	0	0

5.3 Survey limitations

Practitioners who conduct ecological surveys for environmental impact assessment in Western Australia are obliged to report on the limitations and constraints in such studies. Some potential limitations / constraints on surveys may adversely impact on the scientific rigour, completeness, or the validity of the survey results. EPA (2016) identifies standard limitations which can limit and constrain the validity of surveys. These limitations / constraints and their relevance to this assessment are presented in Table 4.

Table 4: Limitations/constraints that may have affected the survey results

Limitation	Limitation	Details
Availability of contextual information at a regional and local scale	No	Regional floristic and ecological community data (retrievable from FloraBase and DBCA databases), and spatial datasets relating to soils, flora and vegetation for the Bunbury subregion and the Dalyellup locality were readily publicly available.
Competency and experience of the field team	No	The botanical surveyor, Martin Henson, is suitably qualified and experienced, with over 20 years of professional experience conducting botanical surveys for Environmental Impact Assessment in Western Australia, including the Swan Coastal Plain.
Proportion of flora recorded and/or collected, and problems with taxonomic determinations	No	The species accumulation curve shows that a high proportion of the existing flora was collected or recorded during the survey. No problems were encountered with taxonomy of collections.
The effort and extent of the survey	No	Twenty-three sites were recorded over a three-day period, covering the major vegetation types in the Dalyellup area. The Primer analysis showed that there were variations within these that may not have been adequately sampled, however given the homogeneity of the vegetation in aerial photography mapping of smaller units may have been impossible
Access restrictions within the survey area	No	The survey area was fully accessible for the duration of the survey. However, issues were caused by the steepness of the terrain and the density of the vegetation, making some areas extremely difficult to visit.
Survey timing, rainfall, season of survey	No	The survey was undertaken during the optimum time for botanical survey on the Swan Coastal Plain, however as it was towards the end of the Spring season some earlier-flowering ephemeral species (e.g. orchids) may not have been present.
Disturbances that may have affected the results of survey such as fire, vehicle tracks and weeds	No	Disturbances within the survey area included presence of introduced flora species, historical clearing and informal roads and trails. The study area appears to have been free of fire for a number of years. None of the disturbances were a constraint to completing the survey.

6 DISCUSSION

6.1 Significant flora

No Conservation significant flora were recorded during the survey.

6.2 Introduced flora

Twenty-two of the fifty-nine species recorded were introduced, reflecting the historical disturbances to the vegetation in the area. None of the introduced species recorded were WoNS or Declared Organisms that require control measures to be taken. Given this, the majority of the vegetation is in Excellent condition.

6.3 Vegetation

6.3.1 Vegetation types

Although available vegetation statistics do not address the specific vegetation types indicated at Dalyellup, over 26% of the broader type (Quindalup Complex) is held in conservation reserves. Locally, the Kalgulup Regional Park to the north of Dalyellup has 1,295 ha of Quindalup Complex vegetation protected.

The seven vegetation types described from the statistical analysis broadly split into two associations – Tuart woodland/forest and *Acacia* shrubland (Figure E). Results of the desktop review of documents indicate these are common throughout the area. The sites that appeared to be associated with the wrong group (DL06r and DL23r) are likely classified this way because of the co-occurrence of non-dominant species with others in those associations. This is possibly an indication of variation within the vegetation at Dalyellup that has not been described by this survey – indicating more survey sites would likely have produced a slightly different result.

However, the homogeneity of the vegetation in aerial photography made picking these variations in vegetation difficult before the survey and would have meant that, after the survey, mapping smaller vegetation types that rely on species masked by the dominant species was extremely difficult. On this basis, the current vegetation type mapping is considered to be accurate for its purpose.

The vegetation types included in the tuart association as well as DL06r (but not including DL18r) appear to be the EPBC listed TEC '*Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain*'. Site DL20r, the tuart reference site outside the study area, also appears to be part of this TEC. Site DL18r appears to be included in the tuart association because of the presence of the weeping peppermint, *Agonis flexuosa*, but the tuart does not appear in this vegetation type.

Vegetation types included in the *Acacia* association appear common throughout the area and do not correlate to any known TEC or PEC.

6.3.2 Vegetation condition

The vegetation is in Good to Excellent condition, with the majority of it at the upper end of the Keighery (1994) condition scale.

The sites that were recorded as Good were primarily assessed that way due to weed invasion – they still have some vegetation structure but are missing the lower vegetation stratum because of weed cover. Given the Excellent condition of much of the vegetation in the study area, measures should be taken to make sure weed invasion or other elements of disturbance do not affect the existing vegetation following any development.

6.3.3 Significant vegetation

The DBCA listed PEC and EPBC Listed TEC '*Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain*' is present in (possibly) previously unreported stands. As part of the Quindalup Complex, Tuart vegetation is protected in the adjacent Kalgulup Regional Park, with approximately 60% of the pre-European extent of the Complex remaining.

REPORT

This TEC is described in the vegetation types (Figure E) EgAfArLg (light green), EgAfHcLg (purple), EgAfAbLg (dark brown) and EgAfAcLg (dark green).

Disturbance of these vegetation types will require an EPBC referral and subsequent approval.

It is recommended that these occurrences be reported to the DBCA and DAWE to be added to the databases if necessary, so that they are recorded for future reference.

7 REFERENCES

- ABS (2017) Australian Bureau of Statistics 2016 Census Quickstats https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/SSC50375 Accessed Dec. 2021.
- AWC 2007. The Australian Weeds Strategy. A national strategy for weed management in Australia. Natural Resource Management Ministerial Council, Australian Weeds Committee, Canberra, ACT. Available at: <http://www.environment.gov.au/biodiversity/invasive/weeds/publications/strategies/pubs/weed-strategy.pdf>.
- BoM (2021) Bureau of Meteorology: Australia's official weather forecasts <http://www.bom.gov.au> Accessed December 2021.
- Clarke, R. and Gorley, R. N (2015) Primer 7. PRIMER-E Ltd, Devon PL21 9RH, United Kingdom.
- DAWE (2017) Australian Weed Strategy 2017-2027 Invasive Plant and Animal Committee, Department of Agriculture, Water and the Environment Canberra ACT.
- DAWE (2019) <https://www.awe.gov.au/environment/biodiversity/threatened/communities/wa> Accessed December 2021.
- DBCA (2017) Priority Ecological Communities for Western Australia Version 27. Species and Communities Branch Department of Biodiversity, Conservation and Attractions https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/priority_ecological_communities_list.pdf Accessed December 2021.
- DBCA (2018) Vegetation Complexes of the Swan Coastal Plain <https://catalogue.data.wa.gov.au/dataset/75cc083c-d958-4a00-8f51-11983d69aaf5/resource/ba3b1bcc-5e27-4d74-aedf-96ac1be7f732/download/vege> Accessed December 2021.
- DBCA (2019) 2018 State-wide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019. WA Department of Biodiversity, Conservation and Attractions, Perth.
- DBCA (2021) Kalgulup Regional Park management plan 2021 Department of Biodiversity, Conservation and Attractions, Perth.
- DoEE (2019a) Approved Conservation Advice (incorporating listing advice) for the Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain. DoEE Canberra <https://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=153> accessed December 2021.
- DoEE (2019b) Tuart Woodlands and Forests of the Swan Coastal Plain: A Nationally Significant Ecological Community DoEE Canberra <https://www.awe.gov.au/sites/default/files/documents/tuart-woodlands-forests-swan-coastal-plain-guide.pdf> Accessed December 2021.
- Ecoedge (2017) Report of a Level 1 Flora and Vegetation Survey at Dalyellup Beach. Unpublished report prepared for RPS, Perth, Western Australia.
- Ekologica (2012a) A flora and vegetation survey along part of Dalyellup Boulevard. Unpublished report prepared for RPS, Perth, Western Australia.
- Ekologica (2012b) Vegetation Survey of the Proposed Tourist Precinct at Dalyellup. Unpublished report prepared for RPS, Perth, Western Australia.
- English, V and Blyth, J (1997) Identifying and conserving threatened ecological communities (TECs) in the South West Botanical Province ANCA National Reserves Cooperative Program: Project Number N702. Final report May 1997.
- EPA (2016) Technical Guidance: Flora and vegetation surveys for environmental impact assessment. Environmental Protection Authority, Perth, WA.
- EPA. 2016a. Environmental Factor Guideline: Flora and vegetation. Environmental Protection Authority, Perth, WA. Available at: http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Guideline-Flora-Vegetation-131216_4.pdf Accessed Dec. 2021
- Keighery, B.J. (1994). Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (inc.) Nedlands, Western Australia.
- Mitchell, D., Williams, K. and Desmond, A. Swan Coastal plain 2 (Swan coastal Plain subregion) from A Biodiversity Audit of Western Australia's 53 Biogeographical subregions in 2002. Department of Conservation and Land Management, Perth, Western Australia.
- NVIS Technical Working Group, 2017 Australian Vegetation Attribute Manual: National Vegetation Information System, Version 7.0. Department of the Environment and Energy, Canberra. Prep by Bolton, M.P. de Lacey, C. and Bossard, K.B. (Eds).

Figures

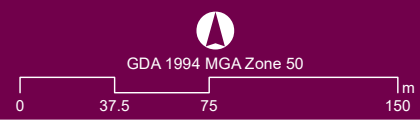




LEGEND

- Site boundary
- Survey area
- Existing cadastre

Figure A
Site location



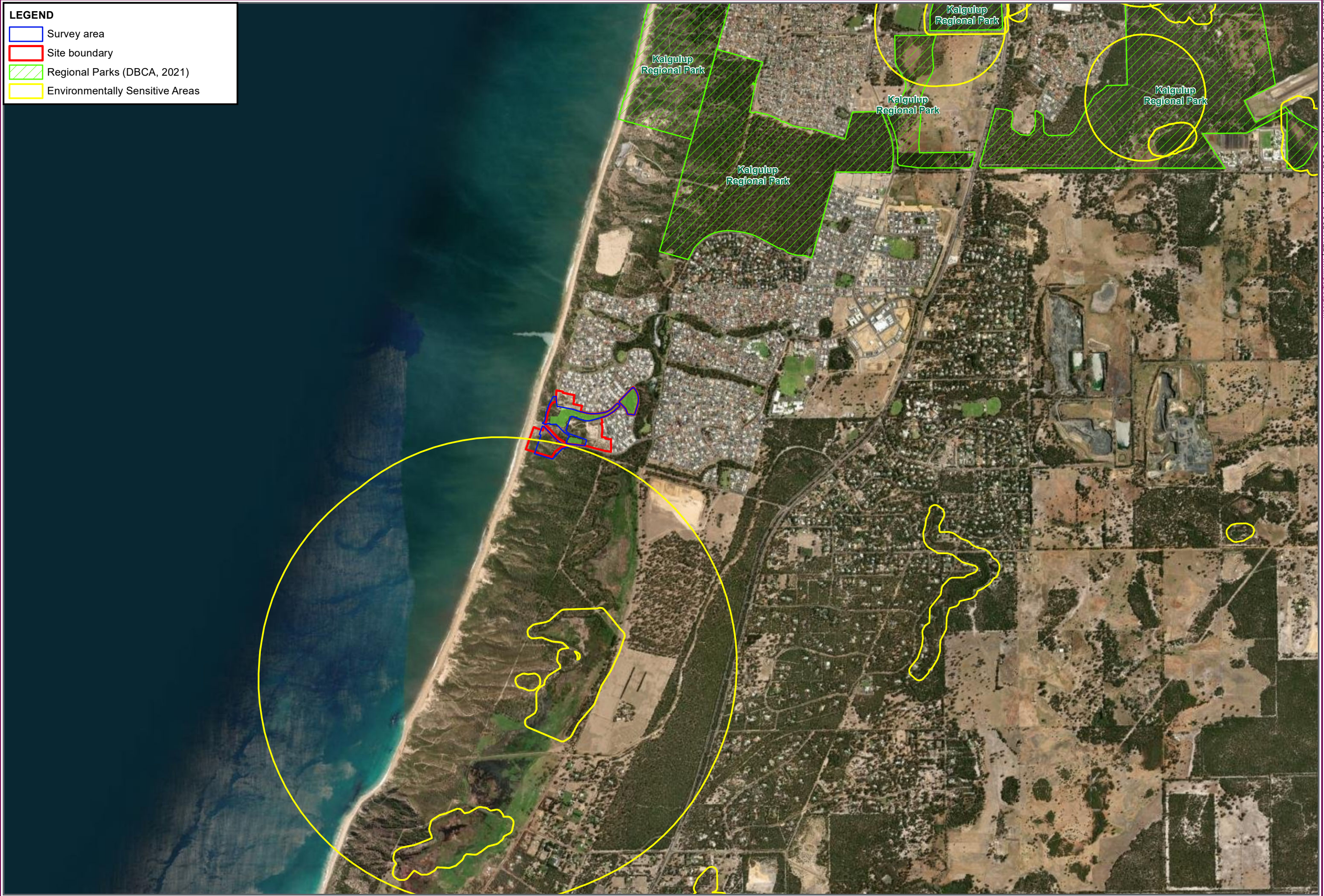
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Source: Cadastre - Landgate Orthophoto - Landgate, 2021

LEGEND

- Survey area
- Site boundary
- Regional Parks (DBCA, 2021)
- Environmentally Sensitive Areas



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Figure B

Protected areas

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GDA 1994 MGA Zone 50

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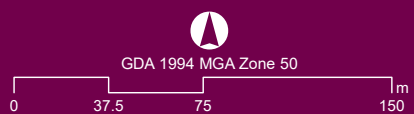


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Figure C

Survey sites

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Source: Cadastre - Landgate Orthophoto - Landgate, 2021

LEGEND

- Survey area
- Site boundary

Threatened and Priority Flora (DBCA, 2021)

Conservation Status

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

Conservation significant ecological communities

State category

- Critically Endangered
- Endangered
- Vulnerable
- Priority 3

Common name

- Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region
- Coastal shrublands on shallow sands
- Corymbia calophylla - Xanthorrhoea preissii woodlands and shrublands, Swan Coastal Plain (floristic community type 3c as originally described in Gibson et al. (1994))
- Corymbia calophylla woodlands on heavy soils of the southern Swan Coastal Plain (floristic community type 1b as originally described in Gibson et al. (1994))
- Dense shrublands on clay flats (floristic community type 9 as originally described in Gibson et al. (1994))
- Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))
- Low lying Banksia attenuata woodlands or shrublands
- Quindalup Eucalyptus gomphocephala and/or Agonis flexuosa woodlands
- Sedgeland in Holocene dune swales of the southern Swan Coastal Plain (floristic community type 19 as originally described in Gibson et al. (1994))
- Shrublands on calcareous silts of the Swan Coastal Plain (floristic community type 18 as originally described in Gibson et al. (1994))
- Shrublands on dry clay flats (floristic community type 10a as originally described in Gibson et al. (1994))
- Southern Banksia attenuata woodlands
- Southern Eucalyptus gomphocephala-Agonis flexuosa woodlands
- Subtropical and Temperate Coastal Saltmarsh
- Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain
- Woodlands over sedgeland in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994)).

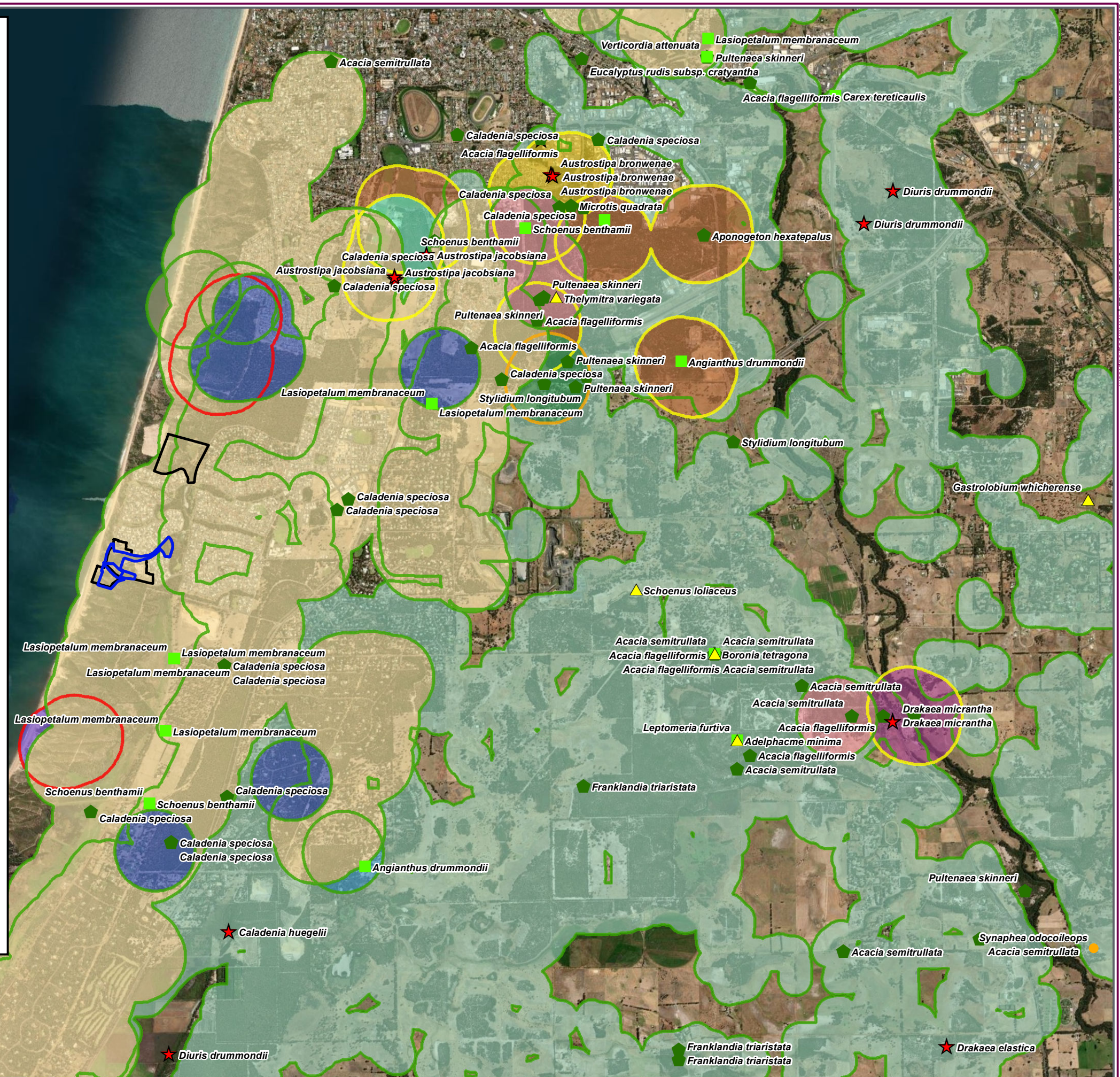
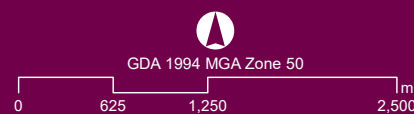


Figure D

DBCA database records

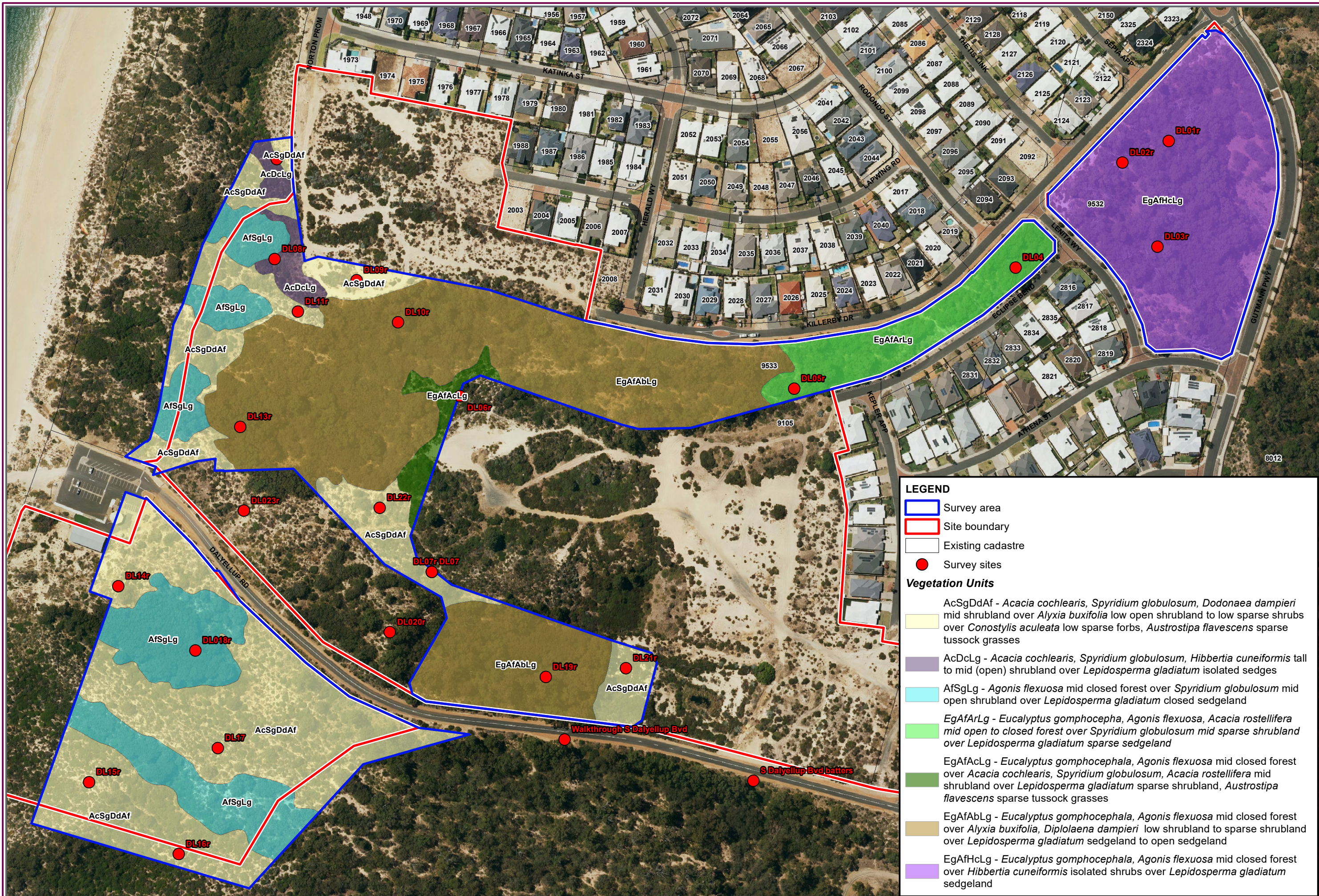
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LEGEND

- Survey area
- Site boundary
- Existing cadastre
- Survey sites

Vegetation Units

- AcSgDdAf - *Acacia cochlearis*, *Spyridium globulosum*, *Dodonaea dampieri* mid shrubland over *Alyxia buxifolia* low open shrubland to low sparse shrubs over *Conostylis aculeata* low sparse forbs, *Austrostipa flavescens* sparse tussock grasses
- AcDcLg - *Acacia cochlearis*, *Spyridium globulosum*, *Hibbertia cuneiformis* tall to mid (open) shrubland over *Lepidosperma gladiatum* isolated sedges
- AfSgLg - *Agonis flexuosa* mid closed forest over *Spyridium globulosum* mid open shrubland over *Lepidosperma gladiatum* closed sedgeland
- EgAfArLg - *Eucalyptus gomphocephala*, *Agonis flexuosa*, *Acacia rostellifera* mid open to closed forest over *Spyridium globulosum* mid sparse shrubland over *Lepidosperma gladiatum* sparse sedgeland
- EgAfAcLg - *Eucalyptus gomphocephala*, *Agonis flexuosa* mid closed forest over *Acacia cochlearis*, *Spyridium globulosum*, *Acacia rostellifera* mid shrubland over *Lepidosperma gladiatum* sparse shrubland, *Austrostipa flavescens* sparse tussock grasses
- EgAfAbLg - *Eucalyptus gomphocephala*, *Agonis flexuosa* mid closed forest over *Alyxia buxifolia*, *Diplolaena dampieri* low shrubland to sparse shrubland over *Lepidosperma gladiatum* sedgeland to open sedgeland
- EgAfHcLg - *Eucalyptus gomphocephala*, *Agonis flexuosa* mid closed forest over *Hibbertia cuneiformis* isolated shrubs over *Lepidosperma gladiatum* sedgeland

Figure E
Vegetation types in the study area

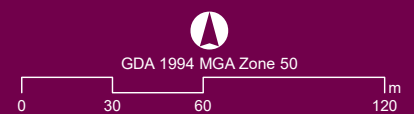
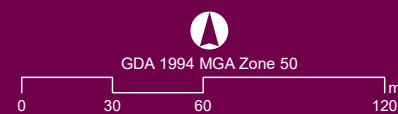




Figure F
Vegetation condition in the study area

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Appendix A

Definitions



APPENDIX A: DEFINITIONS

Table A-1: Conservation codes for Western Australian flora and fauna

Category	Definition
Threatened species	
T	<p>Threatened species</p> <p>Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act).</p> <p>Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for Threatened Fauna.</p> <p>Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for Threatened Flora.</p> <p>The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.</p>
CR	<p>Critically endangered species</p> <p>Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines".</p> <p>Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.</p>
EN	<p>Endangered species</p> <p>Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines".</p> <p>Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.</p>
VU	<p>Vulnerable species</p> <p>Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines".</p> <p>Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.</p>
Extinct species	
EX	<p>Extinct species</p> <p>Species where "there is no reasonable doubt that the last member of the species has died", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).</p> <p>Published as presumed extinct under schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for extinct fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for extinct flora.</p>
EW	<p>Extinct in the wild species</p> <p>Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).</p> <p>Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.</p>
Specially protected species	
	<p>Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection. Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.</p>

Category	Definition
M	<p>Migratory species</p> <p>Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).</p> <p>Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, which are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.</p> <p>Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.</p>
CD	<p>Species of special conservation interest (conservation dependent fauna)</p> <p>Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).</p> <p>Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.</p>
OS	<p>Other specially protected species</p> <p>Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).</p> <p>Published as other specially protected fauna under schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.</p>
Priority species	
P	<p>Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.</p> <p>Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.</p> <p>Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.</p>
P1	<p>Priority 1: Poorly-known species</p> <p>Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.</p>
P2	<p>Priority 2: Poorly-known species</p> <p>Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.</p>
P3	<p>Priority 3: Poorly-known species</p> <p>Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations 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 locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species need further survey</p>
P4	<p>Priority 4: Rare, Near Threatened and other species in need of monitoring</p> <p>(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.</p> <p>(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.</p> <p>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy</p>

(Source: DBCA 2019)

Table A-2: EPBC Act conservation codes

Category	Definition
EX	<p>Extinct</p> <p>A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual) throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.</p>
EW	<p>Extinct in the Wild</p> <p>A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual) throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.</p>
CR	<p>Critically Endangered</p> <p>A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.</p>
EN	<p>Endangered</p> <p>A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.</p>
VU	<p>Vulnerable</p> <p>A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction in the wild.</p>
NT	<p>Near Threatened</p> <p>A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.</p>
LC	<p>Least Concern</p> <p>A taxon is Least Concern when it has been evaluated against the criteria and it does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.</p>
DD	<p>Data Deficient</p> <p>A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases, great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period has elapsed since the last record of the taxon, threatened status may well be justified.</p>
NE	<p>Not Evaluated</p> <p>A taxon is Not Evaluated when it has not yet been evaluated against the criteria.</p>

(Source: IUCN 2019)

Table A-3: Threatened ecological communities category of threat

Category	Definition
Presumed Totally Destroyed (PD)	<p>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:</p> <p>Records within the last 50 years have not been confirmed despite thorough searches or known or likely habitats or.</p> <p>All occurrences recorded within the last 50 years have since been destroyed.</p>
Critically Endangered (CR)	<p>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. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria:</p> <p>The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply: Geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately five years).</p> <p>Modification throughout its range is continuing such that in the immediate future (within approximately five years) the community is unlikely to be capable of being substantially rehabilitated.</p> <p>Current distribution is limited, and one or more of the following apply (i, ii or iii):</p> <p>Geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes, which are likely to result in total destruction throughout its range in the immediate future (within approximately five years).</p> <p>There are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes.</p> <p>There may be many occurrences, but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.</p> <p>The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately five years).</p>
Endangered (EN)	<p>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. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C):</p> <p>The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 70% and either or both of the following apply (i or ii)</p> <p>Geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term (within approximately 10 years).</p> <p>Modification throughout its range is continuing such that in the short-term future (within approximately 10 years) the community is unlikely to be capable of being substantially restored or rehabilitated.</p> <p>Current distribution is limited, and one or more of the following apply (i, ii or iii):</p> <p>Geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short-term future (within approximately 10 years).</p> <p>There are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes.</p> <p>There may be many occurrences, but total area is very small, and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.</p> <p>The ecological community exists only as highly modified occurrences, which may be capable of being rehabilitated if such work begins in the short-term future (within approximately 10 years).</p>
Vulnerable (VU)	<p>An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction in the medium to long term future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C):</p> <p>The ecological community exists largely as modified occurrences, which are likely to be capable of being substantially restored or rehabilitated.</p> <p>The ecological community can be modified or destroyed and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.</p> <p>The ecological community may still be widespread but is believed likely to move into a category of higher threat in the medium to long-term future because of existing or impending threatening processes.</p>

Category	Definition
Data Deficient (DD)	An ecological community, which has not been adequately evaluated with respect to status or where there is currently insufficient information to assign it to a particular category. (An ecological community with poorly known distribution or biology that is suspected to belong to any of the above categories. These ecological communities have a high priority for survey and/or research).
Lower Risk (LR)	An ecological community that has been adequately surveyed and does not qualify for any of the above categories of threat and appears unlikely to be under threat of significant modification or destruction in the short to medium term future.

(Source: English and Blyth 1997)

Table A-4: Priority ecological communities category of threat

Category	Definition
P1	<p>Priority One: Poorly-known ecological communities</p> <p>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.</p> <p>Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.</p>
P2	<p>Priority Two: Poorly-known ecological communities</p> <p>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, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.</p> <p>Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.</p>
P3	<p>Priority Three: Poorly known ecological communities</p> <p>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:</p> <p>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</p> <p>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 by domestic and/or feral stock, and inappropriate fire regimes.</p> <p>Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.</p>
P4	<p>Priority Four: 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.</p> <p>Rare. Ecological communities known from few occurrences 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 communities are usually represented on conservation lands.</p> <p>Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>Ecological communities that have been removed from the list of threatened communities during the past five years.</p>
P5	<p>Priority Five: Conservation Dependent ecological communities</p> <p>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.</p>

(Source: DEC 2013)

Table A-5: EPBC Act listed threatened ecological communities category of threat

Category	Definition
CR	Critically Endangered If an ecological community is facing an extremely high risk of extinction in the wild in the immediate future.
EN	Endangered If an ecological community is not Critically Endangered but is facing a very high risk of extinction in the wild in the immediate future.
VU	Vulnerable If an ecological community is not Critically Endangered or Endangered but is facing a very high risk of extinction in the wild in the medium-term future.

Table A-6: NVIS vegetation structure classes

Stratum	Growth form	Height	Structural formation classes (% cover)					
			80-100	50-80	20-50	0.25-20	0-0.25	Unknown
U	Tree, palm	Tall; Mid; Low	Closed forest	Open forest	Woodland	Open woodland	Isolated trees	Isolated clumps of trees
	Tree mallee	Tall; Mid; Low	Closed mallee forest	Open mallee forest	Mallee woodland	Open mallee woodland	Isolated mallee trees	Isolated clumps of mallee trees
M	Shrub, cycad, grass-tree, tree-fern	Tall; Mid; Low	Closed shrubland	Shrubland	Open shrubland	Sparse shrubland	Isolated shrubs	Isolated clumps of shrubs
	Mallee shrub	Tall; Mid; Low	Closed mallee shrubland	Mallee shrubland	Open mallee shrubland	Sparse mallee shrubland	Isolated mallee shrubs	Isolated clumps of mallee shrubs
	Heath shrub	Tall; Mid; Low	Closed heathland	Heathland	Open heathland	Sparse heathland	Isolated heath shrubs	Isolated clumps of heath shrubs
	Chenopod shrub	Tall; Mid; Low	Closed chenopod shrubland	Chenopod shrubland	Open chenopod shrubland	Sparse chenopod shrubland	Isolated chenopod shrubs	Isolated clumps of chenopod shrubs
	Samphire shrub	Mid; Low	Closed samphire shrubland	Samphire shrubland	Open samphire shrubland	Sparse samphire shrubland	Isolated samphire shrubs	Isolated clumps of samphire shrubs
G	Hummock grass	Mid; Low	Closed hummock grassland	Hummock grassland	Open hummock grassland	Sparse hummock grassland	Isolated hummock grasses	Isolated clumps of hummock grasses
	Tussock grass	Mid; Low	Closed tussock grassland	Tussock grassland	Open tussock grassland	Sparse tussock grassland	Isolated tussock grasses	Isolated clumps of tussock grasses
	Other grass	Mid; Low	Closed grassland	Grassland	Open grassland	Sparse grassland	Isolated grasses	Isolated clumps of grasses
	Sedge	Mid; Low	Closed sedgeland	Sedgeland	Open sedgeland	Sparse sedgeland	Isolated sedges	Isolated clumps of sedges
	Rush	Mid; Low	Closed rushland	Rushland	Open rushland	Sparse rushland	Isolated rushes	Isolated clumps of rushes
	Forb (Herb)	Mid; Low	Closed forbland	Forbland	Open forbland	Sparse forbland	Isolated forbs	Isolated clumps of forbs

(Source: ESCAVI 2003)

Table A-7: NVIS vegetation height classes

Height class	Height range (m)	Growth form			
		Tree, vine (m and u), palm (single-stemmed)	Shrub, heath shrub, chenopod shrub, ferns, samphire shrub, cycad, tree-fern, grass-tree, palm (multi-stemmed)	Tree mallee, mallee shrub	Tussock grass, hummock grass, other grass, sedge, rush, forbs, vine (g)
8	>30	Tall			
7	10–30	Mid		Tall	
6	<10	Low		Mid	
5				Low	
4	>2		Tall		Tall
3	1–2		Mid		Tall
2	0.5–1		Low		Mid
1	<0.5		Low		Low

(Source: ESCAVI 2003)

Table A-8: Vegetation condition scale

Condition	Definition
P Pristine	No obvious signs of disturbance.
E Excellent	Vegetation structure intact, disturbance affecting individual species; weeds are non-aggressive species
V Very Good	Vegetation structure altered; obvious signs of disturbance
G Good	Vegetation structure significantly altered by very obvious signs of multiple disturbance; basic vegetation structure or ability to regenerate it is retained
D Degraded	Basic vegetation structure severely impacted by disturbance; scope for regeneration but not to a state approaching good (sic) condition without intensive management
C Completely Degraded	Vegetation structure not intact; the area completely or almost completely without native species (“parkland cleared”).

(Source: adapted from Keighery 1994 and Trudgen 1988)

Appendix B

Site details



SATPRO Dalyellup

Site DL01r

Described by MJH

Date 16/11/2021 Type R

Season E

Uniformity

Location Dalyellup

MGA Zone 50 370802 mE 6303121 mN 115.610656 E -33.403349 S

Habitat Dune swale

Soil Sand

Rock Type

Vegetation Eucalyptus gomphocephala over Agonis flexuosa over Lepidosperma gladiatum

Veg Condition Excellent

Fire Age 10+

Notes

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Agonis flexuosa	30	25-33.3%	15		
Amaranthus albus	+	<1 %	0.25	02	
Eucalyptus gomphocephala	60	50-75%	25		
Hardenbergia comptoniana	1	<1 %			
Hibbertia cuneiformis	2	1-5%	2		
Hydrocotyle hispidula	+	<1 %	0.01	03	
Lepidosperma gladiatum	50	50-75%	1.5		
Medicago littoralis	+	<1 %	10	04	
Trachymene pilosa	+	<1 %	0.15	01	

SATPRO Dalyellup

Site DL02r

Described by MJH

Date 16/11/2021 Type R

Season E

Uniformity

Location

MGA Zone 50 370750 mE 6303089 mN 115.610092 E -33.403631 S

Habitat Dune swale

Soil sand

Rock Type

Vegetation Eucalyptus gomphocephala over Agonis flexuosa over Spyridium globulosum, Hibbertia cuneiformis

Veg Condition Excellent

Fire Age 10+

Notes**SPECIES LIST:**

Name	Cover	C Class	Height	Specimen Notes
Acanthocarpus preissii	+	<1 %	0.5	01
Agonis flexuosa	40	33.3-50%	12	
Austrostipa flavescens	+	<1 %	0.8	07
Bellardia trixago	+	<1 %	0.3	04
Eucalyptus gomphocephala	10	5-10%	25	
Geranium retrorsum	1	<1 %	0.3	02
Hardenbergia comptoniana	1	<1 %		
Hibbertia cuneiformis	1	<1 %	2	
Hydrocotyle hispidula	0.5	<1 %	0.01	
Lagurus ovatus	40	33.3-50%	0.4	03
Lobelia heterophylla	0.5	<1 %	0.3	06
Medicago littoralis	+	<1 %	0.15	=DLr01
Medicago littoralis	1	<1 %	.03	05
Phyllanthus calycinus	+	<1 %	0.3	
Spyridium globulosum	3	1-5%	2.5	
Trachymene pilosa	1	<1 %	0.2	

SATPRO Dalyellup

Site DL03r

Described by MJH

Date 16/11/2021 Type R

Season E

Uniformity

Location

MGA Zone 50 370776 mE 6303038 mN 115.610365 E -33.404094 S

Habitat Dune swalw

Soil sand

Rock Type

Vegetation Eucalyptus gomphocephala over Agonis flexuosa over Lepidosperma gladiatum

Veg Condition Excellent

Fire Age 10+

Notes**SPECIES LIST:**

Name	Cover	C Class	Height	Specimen Notes
Agonis flexuosa	50	50-75%	10	
Eucalyptus gomphocephala	50	50-75%	25	
Geranium retrorsum	+	<1 %	0.1	
Hibbertia cuneiformis	+	<1 %	1.2	
Hydrocotyle hispidula	+	<1 %	0.01	
Lepidosperma gladiatum	30	25-33.3%	1	

SATPRO Dalyellup

Site DL04r

Described by MJH

Date 16/11/2021 Type R

Season E

Uniformity

Location Dalyellup

MGA Zone 50 370680 mE 6703014 mN 115.661955 E -29.796391 S

Habitat Sand dune slope with low forest vegetation

Soil sand

Rock Type

Vegetation Eucalyptus gomphocephala, Agonis flexuosa, Acacia rostellifera forest over weeds

Veg Condition Good

Fire Age 10+

Notes Understorey planted, Tuart and Peppy natural?

SPECIES LIST:

Name	Cover	C Class	Height	Specimen Notes
Acacia rostellifera	40	33.3-50%	10	01
Acanthocarpus preissii	+	<1 %	0.5	
Agonis flexuosa	20	10-25%	10	
Avena barbata	+	<1 %	1	
Ehrharta longiflora	30	25-33.3%	0.3	
Eucalyptus gomphocephala	5	5-10%	20	
Hibbertia cuneiformis	1	<1 %	1.2	
Lolium rigidum	20	10-25%	0.6	
Rhagodia baccata	2	1-5%	1.5	
Sonchus oleraceus	+	<1 %	0.5	
Spyridium globulosum	10	5-10%	2.5	
Templetonia retusa	+	<1 %	1	

SATPRO Dalyellup

Site DL05r

Described by MJH

Date 16/11/2021 Type

Season E

Uniformity

Location

MGA Zone 50 370500 mE 6302907 mN 115.607378 E -33.405242 S

Habitat Dune slope

Soil sand

Rock Type

Vegetation Eucalyptus gomphocephala over Agonis flexuosa, Acacia rostellifera

Veg Condition Good

Fire Age

Notes =DLr04

SPECIES LIST:

Name	Cover	C Class	Height	Specimen Notes
Acacia rostellifera	40	33.3-50%	8	
Agonis flexuosa	50	50-75%	8	
Alyxia buxifolia	20	10-25%	1.5	
Austrostipa flavescens	1	<1 %	0.2	
Eucalyptus gomphocephala	20	10-25%	20	
Geranium retrorsum	1	<1 %	0.25	
Lepidosperma gladiatum	2	1-5%	1	
Lolium rigidum	+	<1 %	0.2	
Spyridium globulosum	20	10-25%	1.8	
Templetonia retusa	1	<1 %	1	

SATPRO Dalyellup

Site DL06r

Described by MJH

Date 16/11/2021 Type R

Season E

Uniformity

Location

MGA Zone 50 370261 mE 6302913 mN 115.604810 E -33.405159 S

Habitat Dune slope

Soil sand

Rock Type

Vegetation Eucalyptus gomphocephala over Agonis flexuosa over Spyridium globulosum, Acacia rostellifera, Acacia cochlearis

Veg Condition Very Good

Fire Age 10+

Notes**SPECIES LIST:**

Name	Cover	C Class	Height	Specimen	Notes
Acacia cochlearis	5	5-10%	1.5		
Acacia rostellifera	5	5-10%	2		
Acanthocarpus preissii	2	1-5%	1		
Agonis flexuosa	50	50-75%	10		
Amaranthus albus	+	<1 %	0.3		
Austrostipa flavescens	+	<1 %	1		
Conostylis aculeata	+	<1 %	0.15	02	
Daucus glochidiatus	+	<1 %	0.1		
Diplolaena dampieri	1	<1 %	1		
Eucalyptus gomphocephala	40	33.3-50%	20		
Jacksonia furcellata	1	<1 %	1.8		
Lobelia heterophylla	0.5	<1 %	0.4		
Lysimachia arvensis	+	<1 %	0.1		
Olearia axillaris	1	<1 %	1.5		
Phyllanthus calycinus	+	<1 %	0.3		
Rhagodia baccata	2	1-5%	1		
Spyridium globulosum	20	10-25%	2		
Trachymene pilosa	+	<1 %	0.1		

SATPRO Dalyellup

Site DL07r

Described by MJH

Date 16/11/2021 Type R

Season E

Uniformity

Location

MGA Zone 50 370240 mE 6303779 mN 115.604709 E -33.397348 S

Habitat dune slope

Soil sand

Rock Type**Vegetation** Acacia cochlearis, Diplolaena dampieri mid open shrubland over Acanthocarpus preissii low open shrubland over Austrostipa sp.**Veg Condition** Excellent**Fire Age** 10+**Notes****SPECIES LIST:**

Name	Cover	C Class	Height	Specimen Notes
Acacia cochlearis	40	33.3-50%	1.5	
Acanthocarpus preissii	20	10-25%	0.3	
Alyxia buxifolia	+	<1 %	1	01 myoporu
Austrostipa flavescens	2	1-5%	1	
Diplolaena dampieri	20	10-25%	1.5	
Hibbertia cuneiformis	+	<1 %	1	
Jacksonia furcellata	+	<1 %	1.5	
Lobelia heterophylla	+	<1 %	0.3	
Olearia axillaris	1	<1 %	1.2	
Rhagodia baccata	1	<1 %	0.3	
Trachyandra divaricata	+	<1 %	0.3	
Trachymene pilosa	+	<1 %	0.1	

SATPRO Dalyellup

Site DL08r

Described by MJH

Date 17/11/2021 Type R

Season

Uniformity

Location

MGA Zone 50 370123 mE 6303018 mN 115.603341 E -33.404196 S

Habitat Dune swale

Soil sand

Rock Type

Vegetation Acacia cochlearis tall sparse shrubland over Rhagodia baccata, Diplolaena dampieri mid shrubland over

Veg Condition Excellent

Fire Age 10+

Notes

SPECIES LIST:

Name	Cover	C Class	Height	Specimen Notes
Acacia cochlearis	5	5-10%	3	
Alyxia buxifolia	1	<1 %	1.5	
Amaranthus albus	0.5	<1 %	0.3	
Anthocercis littorea	2	1-5%	2.5	
Austrostipa flavescens	1	<1 %	1	
Avena barbata	+	<1 %	1	
Cassutha racemosa	3	1-5%		
Clematis linearifolia	3	1-5%		
Diplolaena dampieri	50	50-75%	1.8	
Hardenbergia comptoniana	+	<1 %		
Lagurus ovatus	1	<1 %	0.4	
Lepidosperma gladiatum	+	<1 %	1	
Poa poiformis	+	<1 %	1	
Rhagodia baccata	20	10-25%	1	
Santalum acuminatum	1	<1 %	1.2	
Trachyandra divaricata	2	1-5%	0.5	

SATPRO Dalyellup

Site DL09r

Described by MJH

Date 17/11/2021 Type R

Season E

Uniformity

Location Dayellup

MGA Zone 50 370187 mE 6303001 mN 115.604027 E -33.404357 S

Habitat Disturbed dune

Soil sand

Rock Type

Vegetation Acacia cochlearis, Olearia axillaris, Hibbertia cuneiformis mid shrubland over Diplolaena dampieri low sparse shrubs over Trachyandra divaricata, Euphorbia terracina sparse forbland

Veg Condition Good

Fire Age 10+

Notes Dune regrowth behind housing development

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia cochlearis	60	50-75%	1.2		
Avena barbata	2	1-5%	1		
Diplolaena dampieri	3	1-5%	0.8		
Ehrharta calycina	1	<1 %	0.8		
Euphorbia terracina	4	1-5%	0.4	01	
Hibbertia cuneiformis	1	<1 %	1.2		
Lagurus ovatus	+	<1 %	0.2		
Olearia axillaris	2	1-5%	1		
Trachyandra divaricata	15	10-25%	0.4		

SATPRO Dalyellup

Site DL10r

Described by MJH

Date 17/11/2021 Type R

Season E

Uniformity

Location**MGA Zone**

mE

mN

E

S

Habitat Dune swale**Soil** sand**Rock Type****Vegetation** Eucalyptus gomphocephala, Agonis flexuosa tall closed forest over Alyxia buxifolia, Spyridium globulosum mid open shrubland over Diplolaena dampierilow sparse shrubs**Veg Condition** Excellent**Fire Age** 10+**Notes****SPECIES LIST:**

Name	Cover	C Class	Height	Specimen	Notes
Acanthocarpus preissii	+	<1 %	0.5		
Agonis flexuosa	70	50-75%	15		
Alyxia buxifolia	25	25-33.3%	2.5		
Arctotheca calendula	+	<1 %	1	01	
Austrostipa flavescens	+	<1 %	0.5		
Daucus glochidiatus	+	<1 %	0.15		
Diplolaena dampieri	5	5-10%	1		
Eucalyptus gomphocephala	10	5-10%	25		
Geranium retrorsum	+	<1 %	0.3		
Hardenbergia comptoniana	1	<1 %			
Lepidosperma gladiatum	2	1-5%	1.5		
Leucopogon parviflorus	+	<1 %	0.3		
Stachys arvensis	+	<1 %	0.2	02	

SATPRO Dalyellup

Site DL11r

Described by MJH

Date 17/11/2021 Type R

Season E

Uniformity

Location

MGA Zone 50 370137 mE 6302976 mN 115.603486 E -33.404576 S

Habitat Dune crest

Soil sand

Rock Type**Vegetation** Santalum acuminatum low sparse trees over Acacia cochlearis, Diplolaena dampieri open shrubland over Trachyandra divaricata open forbland**Veg Condition** Excellent**Fire Age** 10**Notes****SPECIES LIST:**

Name	Cover	C Class	Height	Specimen Notes
Acacia cochlearis	20	10-25%	1.5	
Acanthocarpus preissii	4	1-5%	0.5	
Alyxia buxifolia	1	<1 %	1	
Conostylis aculeata	0.5	<1 %	0.3	
Diplolaena dampieri	5	5-10%	1	
Jacksonia furcellata	+	<1 %	1.5	
Lobelia heterophylla	+	<1 %	0.3	
Santalum acuminatum	10	5-10%	1.5	
Senecio pinnatifolius	+	<1 %	0.3	
Trachyandra divaricata	20	10-25%	0.4	

SATPRO Dalyellup

Site DL12r

Described by MJH

Date 17/11/2012 Type R

Season E

Uniformity

Location Dayellup

MGA Zone

mE

mN

E

S

Habitat Dune swale

Soil sand

Rock Type

Vegetation Acacia cochlearis, Spyridium globulosum, Hibbertia cuneiformis shrubland over Trachyandra divaricata open forbland

Veg Condition Very Good

Fire Age 10+

Notes =DL10r

SPECIES LIST:

Name	Cover	C Class	Height	Specimen Notes
Acacia cochlearis	40	33.3-50%	1.2	
Bromus rubens	+	<1 %	0.25	
Cassytha racemosa	5	5-10%		
Hibbertia cuneiformis	1	<1 %	1.2	
Hordeum leporinum	+	<1 %	0.15	wheatgrass
Lagurus ovatus	+	<1 %	0.25	
Lepidosperma gladiatum	1	<1 %	1	
Pelargonium capitatum	3	1-5%	0.4	
Rhagodia baccata	1	<1 %	0.4	
Spyridium globulosum	10	5-10%	1.5	
Trachyandra divaricata	30	25-33.3%	0.3	

SATPRO Dalyellup

Site DL13r

Described by MJH

Date 17/11/2021 Type R

Season E

Uniformity

Location

MGA Zone 50 370089 mE 6302898 mN 115.602958 E -33.405274 S

Habitat Dune swale

Soil soil

Rock Type

Vegetation Eucalyptus gomphocephala, Agonis flexuosa closed foresr over Rhagodia baccata, Alyxia buxifolia mid sparse shrubs over Lepidosperma gladiatum closed sedgeland

Veg Condition Excellent

Fire Age**Notes****SPECIES LIST:**

Name	Cover	C Class	Height	Specimen Notes
Agonis flexuosa	65	50-75%	15	
Alyxia buxifolia	3	1-5%	1.5	
Eucalyptus gomphocephala	30	25-33.3%	25	
Lepidosperma gladiatum	90	>75%	1.5	
Rhagodia baccata	2	1-5%	1.2	

SATPRO Dalyellup

Site DL14r

Described by MJH

Date 17/11/2021 Type R

Season E

Uniformity

Location**MGA Zone**

mE

mN

E

S

Habitat Dune crest/slope**Soil** sand**Rock Type****Vegetation** Acacia cochlearis, Acanthocarpus preissii, Alyxia buxifolia open low shrubland over Spinifex longifolius open grassland, Trachyandra divaricata open forbland**Veg Condition** Excellent**Fire Age** 10+**Notes****SPECIES LIST:**

Name	Cover	C Class	Height	Specimen Notes
Acacia cochlearis	20	10-25%	1	
Acanthocarpus preissii	6	<1 %	0.4	
Alyxia buxifolia	5	5-10%	0.8	
Bromus rubens	1	<1 %	0.3	
Carpobrotus virescens	+	<1 %	0.1	
Cassutha racemosa	2	1-5%		
Conostylis aculeata	+	<1 %	0.25	
Hibbertia cuneiformis	1	<1 %	1.8	
Jacksonia furcellata	+	<1 %	1	
Lagurus ovatus	1	<1 %	0.5	
Lepidosperma gladiatum	+	<1 %	1	
Scaevola crassifolia	2	1-5%	0.8	
Senecio pinnatifolius	+	<1 %	0.3	
Spinifex longifolius	30	25-33.3%	0.8	
Trachyandra divaricata	20	10-25%	0.3	

SATPRO Dalyellup

Site DL15r

Described by MJH

Date 17/11/2021 Type R

Season E

Uniformity

Location**MGA Zone**

mE

mN

E

S

Habitat Dune crest**Soil** sand**Rock Type****Vegetation** Santalum acuminatum low sparse trees over Alyxia buxifolia, Acacia cochlearis, Spyridium globulosum mid shrubland over Acanthocarpus preissii low sparse shrubs**Veg Condition** Excellent**Fire Age** 10+**Notes****SPECIES LIST:**

Name	Cover	C Class	Height	Specimen	Notes
Acacia cochlearis	20	10-25%	1.2		
Alyxia buxifolia	25	25-33.3%	1.5		
Austrostipa flavescens	+	<1 %	1		
Conostylis aculeata	+	<1 %	0.2		
Daucus glochidiatus	+	<1 %	0.1	01	
Olearia axillaris	2	1-5%	1.2		
Santalum acuminatum	2	1-5%	1.5		
Senecio pinnatifolius	+	<1 %	0.3		
Spyridium globulosum	20	10-25%	1.5		
Trachyandra divaricata	+	<1 %	0.3		

SATPRO Dalyellup

Site DL16r

Described by MJH

Date 17/11/2021 Type R

Season E

Uniformity

Location Dalyellup

MGA Zone 50 370049 mE 6302575 mN 115.602482 E -33.408181 S

Habitat Dune crest/slope

Soil

Rock Type

Vegetation *Spyridium globulosum*, *Alyxia buxifolia*, *Diplolaena dampieri* closed shrubland over mixed forbland

Veg Condition Excellent

Fire Age 10+

Notes

SPECIES LIST:

Name	Cover	C Class	Height	Specimen Notes
<i>Acacia cochlearis</i>	2	1-5%	1	
<i>Alyxia buxifolia</i>	10	5-10%	1.5	
<i>Asteridea pulverulenta</i>	+	<1 %	0.3	Whitedaisy
<i>Austrostipa flavescens</i>	+	<1 %	1	
<i>Carpobrotus virescens</i>	+	<1 %	0.1	
<i>Conostylis aculeata</i>	+	<1 %	0.3	
<i>Daucus glochidiatus</i>	0.5	<1 %	0.1	
<i>Diplolaena dampieri</i>	10	5-10%	1	
<i>Dischisma arenarium</i>	+	<1 %	0.1	scrittle
<i>Hemiandra pungens</i>	+	<1 %	0.8	
<i>Lobelia heterophylla</i>	1	<1 %	0.3	
<i>Olearia axillaris</i>	2	1-5%	1.8	
<i>Opercularia vaginata</i>	+	<1 %	0.3	=OPP1
<i>Senecio pinnatifolius</i>	+	<1 %	0.3	
<i>Spyridium globulosum</i>	60	50-75%	2	

SATPRO Dalyellup

Site DL17r

Described by MJH

Date 17/11/2021 Type R

Season E

Uniformity

Location Dalyellup

MGA Zone 50 370089 mE 6302652 mN 115.602923 E -33.407492 S

Habitat Dune slope

Soil Sand

Rock Type

Vegetation Santalum acuminatum low isolated trees over Acacia cochlearis, Spyridium globulosum mid open shrubland over Diplolaena dampieri, Acanthocarpus preissii low open shrubland over Trachyandra divaricata, Trachymene pilosa sparse forbland

Veg Condition Excellent**Fire Age** 10+**Notes****SPECIES LIST:**

Name	Cover	C Class	Height	Specimen Notes
Acacia cochlearis	20	10-25%	2	
Acanthocarpus preissii	6	<1 %	1	
Austrostipa flavescens	2	1-5%	1.5	
Conostylis aculeata	+	<1 %	0.15	
Diplolaena dampieri	15	10-25%	1	
Hibbertia cuneiformis	1	<1 %	2	
Lobelia heterophylla	+	<1 %	0.3	
Olearia axillaris	2	1-5%	2	
Rhagodia baccata	2	1-5%	1.5	
Santalum acuminatum	5	5-10%	1.8	
Senecio pinnatifolius	+	<1 %	0.3	
Spyridium globulosum	10	5-10%	0.5	
Trachyandra divaricata	10	5-10%	0.4	
Trachymene pilosa	2	1-5%	0.1	

SATPRO Dalyellup

Site DL18r

Described by MJH

Date 17/11/2021 Type R

Season E

Uniformity

Location

MGA Zone 50 370066 mE 6302722 mN 115.602686 E -33.406858 S

Habitat Dune swale

Soil Sand

Rock Type

Vegetation Agonis flexuosa closed forest over spyridium globulosum mid sparse shrubland over Lepidosperma gladiatum closed sedgeland

Veg Condition Excellent

Fire Age 10+

Notes**SPECIES LIST:**

Name	Cover	C Class	Height	Specimen Notes
Agonis flexuosa	95	>75%	15	
Alyxia buxifolia	+	<1 %	1	
Hibbertia cuneiformis	+	<1 %	1	
Lepidosperma gladiatum	80	>75%	1.2	
Spyridium globulosum	20	10-25%	2.5	

SATPRO Dalyellup

Site DL19r

Described by MJH

Date 17/11/2021 Type R

Season E

Uniformity

Location**MGA Zone**

mE

mN

E

S

Habitat dune swale**Soil** sand**Rock Type****Vegetation** Eucalyptus gomphocephala, Agonis flexuosa closed forest over Spyridium globulosum, Diplolaena dampieri tall open shrubland over Rhagodia baccata, Alyxia buxifolia mid sparse shrubland over Lepidosperma gladiatum sparse sedgeland**Veg Condition** Excellent**Fire Age** 10+**Notes****SPECIES LIST:**

Name	Cover	C Class	Height	Specimen Notes
Agonis flexuosa	40	33.3-50%	12	
Alyxia buxifolia	55	50-75%	1.5	
Amaranthus albus	+	<1 %	1	
Austrostipa flavescens	1	<1 %	1	
Clematis linearifolia	2	1-5%		
Diplolaena dampieri	10	5-10%	2	
Eucalyptus gomphocephala	40	33.3-50%	25	
Geranium retrorsum	+	<1 %	0.3	
Hardenbergia comptoniana	1	<1 %		
Lepidosperma gladiatum	5	5-10%	1.2	
Rhagodia baccata	10	5-10%	1.5	
Spyridium globulosum	40	33.3-50%	2.5	

SATPRO Dalyellup

Site DL20r

Described by MJH

Date 17/11/2021 Type R

Season E

Uniformity

Location Dalyellup

MGA Zone 50 370208 mE 6302742 mN 115.604215 E -33.406695 S

Habitat Dune slope

Soil Sand

Rock Type

Vegetation Eucalyptus gomphocephala mid open woodland over Agonis flexuosa low open woodland over Alyxia buxifolia, Spyridium globulosum, Acacia cochlearis mid open shrubland over Trachymene pilosa isolated forbs

Veg Condition Excellent

Fire Age 10+

Notes

SPECIES LIST:

Name	Cover	C Class	Height	Specimen Notes
Acacia cochlearis	5	5-10%	1.5	
Agonis flexuosa	10	5-10%	8	
Alyxia buxifolia	10	5-10%	1.5	
Asteridea pulverulenta	+	<1 %	0.4	Whitedaisy
Austrostipa flavescens	1	<1 %	1	
Carpobrotus virescens	+	<1 %	0.1	
Conostylis aculeata	+	<1 %	0.2	
Dischisma arenarium	1	<1 %	0.1	Scrittle
Eucalyptus gomphocephala	15	10-25%	20	
Hordeum leporinum	+	<1 %	0.1	Wheatgrass
Leucopogon parviflorus	5	5-10%	1.5	
Lobelia heterophylla	+	<1 %	0.3	
Olearia axillaris	2	1-5%	1	
Rhagodia baccata	1	<1 %	0.5	
Senecio pinnatifolius	+	<1 %	0.3	
Spyridium globulosum	10	5-10%	1.5	
Trachymene pilosa	2	1-5%	0.1	

SATPRO Dalyellup

Site DL21r

Described by MJH

Date 18/11/2021 Type R

Season E

Uniformity

Location Dalyellup

MGA Zone 50 370384 mE 6302711 mN 115.606103 E -33.406996 S

Habitat Disturbed dune

Soil Sand

Rock Type

Vegetation Acacia cochlearis, Spyridium globulosum, Olearia axillaris tall shrubland over Diplolaena dampieri mid open shrubland over Austrostipa sp. isolated grasses, Trachyandra divaricata isolated forbs

Veg Condition Excellent

Fire Age

Notes Previously disturbed site adjacent to compensation basin

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia cochlearis	20	10-25%	2		
Austrostipa flavescens	2	1-5%	1.2		
Carpobrotus virescens	+	<1 %	0.1		
Diplolaena dampieri	2	1-5%	1.5		
Dischisma arenarium	+	<1 %	0.1		Scrittle
Hordeum leporinum	+	<1 %	0.15		Wheatgrass
Olearia axillaris	5	5-10%	2		
Petrorhagia velutina	+	<1 %	0.4		
Spyridium globulosum	20	10-25%	2		
Thomasia cognata	+	<1 %	0.3		
Trachyandra divaricata	1	<1 %	0.3		
Trachymene pilosa	+	<1 %	0.1		

SATPRO Dalyellup

Site DL22r

Described by MJH

Date 18/11/2021 Type R

Season E

Uniformity

Location Dayellup

MGA Zone 50 370199 mE 6302835 mN 115.604132 E -33.405855 S

Habitat Dune slope, swale

Soil Sand

Rock Type

Vegetation Acacia cochlearis, Spyridium globulosum, Diplolaena dampieri mid shrubland over Acanthocarpus preissii low sparse shrubland over lepidosperma gladiatum sparse sedgeland and Austrostipa sp. sparse grassland

Veg Condition Excellent

Fire Age

Notes

SPECIES LIST:

Name	Cover	C Class	Height	Specimen Notes
Acacia cochlearis	40	33.3-50%	2	
Acanthocarpus preissii	1	<1 %	0.4	
Austrostipa flavescens	10	5-10%	1	
Conostylis aculeata	+	<1 %	0.15	
Diplolaena dampieri	10	5-10%	1.5	
Dischisma arenarium	+	<1 %	0.1	Scrittle
Hordeum leporinum	+	<1 %	0.1	Wheatgrass
Lepidosperma gladiatum	10	5-10%	1.2	
Lobelia heterophylla	+	<1 %	0.4	
Olearia axillaris	+	<1 %	1	
Rhagodia baccata	1	<1 %	1	
Senecio pinnatifolius	+	<1 %	0.4	
Spyridium globulosum	20	10-25%	2	
Trachyandra divaricata	20	10-25%	0.3	

SATPRO Dalyellup

Site DL23r

Described by MJH

Date 17/11/2021 Type R

Season

Uniformity

Location

MGA Zone 50 370095 mE 6302836 mN 115.603014 E -33.405834 S

Habitat Dune crest/slope

Soil

Rock Type

Vegetation

Veg Condition Excellent

Fire Age 10+

Notes

SPECIES LIST:

Name	Cover	C Class	Height	Specimen Notes
Acacia cochlearis	20	10-25%	1.5	
Acanthocarpus preissii	5	5-10%	0.5	
Austrostipa flavescens	5	5-10%	1	
Conostylis aculeata	0.5	<1 %	0.25	
Diplolaena dampieri	2	1-5%	1	
Pelargonium capitatum	+	<1 %	0.3	
Poa poiformis	1	<1 %	0.8	
Senecio pinnatifolius	+	<1 %	0.3	
Spyridium globulosum	5	5-10%	1.8	
Trachyandra divaricata	5	5-10%	0.3	

SATPRO Dalyellup

Site WALKTHROUGH

Described by MJH

Date 18/11/2021 Type V

Season E

Uniformity

Location

MGA Zone 50 370035 mE 6302656 mN 115.602343 E -33.407449 S

Habitat**Soil****Rock Type****Vegetation****Veg Condition****Fire Age**

Notes Walk along roadside. Vegetation generally in degraded condition - shrub growth over weeds. Batter impacts Tuarts at one point (WP377) and comes close at another (WP376) - hard to tell with GPS error

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia cochlearis		<1 %			
Acanthocarpus preissii		<1 %			
Agonis flexuosa		<1 %			
Alyxia buxifolia		<1 %			
Avena barbata		<1 %			
Briza maxima		<1 %			
Bromus rubens		<1 %			
Cassutha racemosa		<1 %			
Diplolaena dampieri		<1 %			
Ehrharta longiflora		<1 %			
Hardenbergia comptoniana		<1 %			
Hypochaeris glabra		<1 %			
Lagurus ovatus		<1 %			
Lepidosperma gladiatum		<1 %			
Olearia axillaris		<1 %			
Rhagodia baccata		<1 %			
Scaevola crassifolia		<1 %			
Spyridium globulosum		<1 %			
Trachyandra divaricata		<1 %			
Trifolium scabrum		<1 %			

Appendix C

Site species list



APPENDIX C: SPECIES LIST

Family	Species
Aizoaceae	<i>Carpobrotus virescens</i>
Amaranthaceae	* <i>Amaranthus albus</i>
Apiaceae	<i>Daucus glochidiatus</i> <i>Trachymene pilosa</i>
Apocynaceae	<i>Alyxia buxifolia</i>
Araliaceae	<i>Hydrocotyle hispidula</i>
Asparagaceae	<i>Acanthocarpus preissii</i>
Asphodelaceae	* <i>Trachyandra divaricata</i>
Asteraceae	* <i>Arctotheca calendula</i> <i>Asteridea pulverulenta</i> * <i>Hypochaeris glabra</i> <i>Olearia axillaris</i> <i>Senecio pinnatifolius</i> * <i>Sonchus oleraceus</i> * <i>Stachys arvensis</i>
Campanulaceae	<i>Lobelia heterophylla</i>
Caryophyllaceae	* <i>Petrorhagia velutina</i>
Chenopodiaceae	<i>Rhagodia baccata</i>
Cyperaceae	<i>Lepidosperma gladiatum</i>
Dilleniaceae	<i>Hibbertia cuneiformis</i>
Ericaceae	<i>Leucopogon parviflorus</i>
Euphorbiaceae	* <i>Euphorbia terracina</i>
Fabaceae	<i>Acacia cochlearis</i> <i>Acacia rostellifera</i> <i>Hardenbergia comptoniana</i> <i>Jacksonia furcellata</i> * <i>Medicago littoralis</i> <i>Templetonia retusa</i> * <i>Trifolium scabrum</i>
Geraniaceae	<i>Geranium retrorsum</i> * <i>Pelargonium capitatum</i>
Goodeniaceae	<i>Scaevola crassifolia</i>
Haemodoraceae	<i>Conostylis aculeata</i>
Lamiaceae	<i>Hemiandra pungens</i>
Lauraceae	<i>Cassytha racemosa</i>
Malvaceae	<i>Thomasia cognata</i>
Myrtaceae	<i>Agonis flexuosa</i> <i>Eucalyptus gomphocephala</i>
Phyllanthaceae	<i>Phyllanthus calycinus</i>
Poaceae	<i>Austrostipa flavescens</i> * <i>Avena barbata</i> * <i>Briza maxima</i> * <i>Bromus rubens</i> * <i>Ehrharta calycina</i> * <i>Ehrharta longiflora</i> * <i>Hordeum leporinum</i> * <i>Lagurus ovatus</i> * <i>Lolium rigidum</i> <i>Poa poiformis</i> <i>Spinifex longifolius</i>
Primulaceae	* <i>Lysimachia arvensis</i>
Ranunculaceae	<i>Clematis linearifolia</i>
Rhamnaceae	<i>Spyridium globulosum</i>
Rubiaceae	<i>Opercularia vaginata</i>
Rutaceae	<i>Diplolaena dampieri</i>
Santalaceae	<i>Santalum acuminatum</i>
Scrophulariaceae	* <i>Bellardia trixago</i> * <i>Dischisma arenarium</i>
Solanaceae	<i>Anthocercis littorea</i>

Appendix D

Species by site



APPENDIX D: SPECIES BY SITE

Species	DL01r	DL02r	DL03r	DL04r	DL05r	DL06r	DL07r	DL08r	DL09r	DL10r	DL11r	DL12r	DL13r	DL14r	DL15r	DL16r	DL17r	DL18r	DL19r	DL20r	DL21r	DL22r	DL 23r
<i>Acacia cochlearis</i>						X	X	X	X		X	X		X	X	X	X			X	X	X	X
<i>Acacia rostellifera</i>				X	X	X																	
<i>Acanthocarpus preissii</i>		X		X		X	X			X	X			X			X					X	X
<i>Agonis flexuosa</i>	X	X	X	X	X	X				X			X					X	X	X			
<i>Alyxia buxifolia</i>					X		X	X		X	X		X	X	X	X		X	X	X			
<i>Amaranthus albus</i>	X					X		X											X				
<i>Anthocercis littorea</i>								X															
<i>Arctotheca calendula</i>										X													
<i>Asteridea pulverulenta</i>										X						X				X			
<i>Austrostipa flavescens</i>		X			X	X	X	X		X					X	X	X		X	X	X	X	X
<i>Avena barbata</i>				X				X	X														
<i>Bellardia trixago</i>		X																					
<i>Bromus rubens</i>												X		X									
<i>Carpobrotus virescens</i>														X		X				X	X		
<i>Cassytha racemosa</i>								X				X		X									
<i>Clematis linearifolia</i>								X											X				
<i>Conostylis aculeata</i>						X					X			X	X	X	X			X		X	X
<i>Daucus glochidiatus</i>						X				X					X	X							
<i>Diplolaena dampieri</i>						X	X	X	X	X	X					X	X		X		X	X	X
<i>Dischisma arenarium</i>																X				X	X	X	
<i>Ehrharta calycina</i>									X														
<i>Ehrharta longiflora</i>				X																			
<i>Eucalyptus gomphocephala</i>	X	X	X	X	X	X				X			X						X	X			
<i>Euphorbia terracina</i>									X														
<i>Geranium retrorsum</i>		X	X		X					X										X			
<i>Hardenbergia comptoniana</i>	X	X						X		X									X				
<i>Hemiandra pungens</i>																X							
<i>Hibbertia cuneiformis</i>	X	X	X	X			X		X			X		X			X	X					
<i>Hordeum leporinum</i>												X								X	X	X	
<i>Hydrocotyle hispidula</i>	X	X	X																				
<i>Jacksonia furcellata</i>						X	X				X			X									
<i>Lagurus ovatus</i>		X						X	X			X		X									
<i>Lepidosperma gladiatum</i>	X		X		X			X		X		X	X	X				X	X			X	
<i>Leucopogon parviflorus</i>										X										X			
<i>Lobelia heterophylla</i>		X				X	X				X					X	X			X		X	
<i>Lolium rigidum</i>				X	X																		
<i>Lysimachia arvensis</i>						X																	
<i>Medicago littoralis</i>	X	X																					
<i>Olearia axillaris</i>						X	X		X						X	X	X			X	X	X	
<i>Opercularia vaginata</i>																X							
<i>Pelargonium capitatum</i>												X											X
<i>Petrorhagia velutina</i>																						X	
<i>Phyllanthus calycinus</i>		X				X																	
<i>Poa poiformis</i>								X															X
<i>Rhagodia baccata</i>				X		X	X	X			X	X					X		X	X	X	X	
<i>Santalum acuminatum</i>								X			X				X		X						
<i>Scaevola crassifolia</i>														X									
<i>Senecio pinnatifolius</i>										X			X	X	X	X			X		X	X	X
<i>Sonchus oleraceus</i>				X																			
<i>Spinifex longifolius</i>														X									
<i>Spyridium globulosum</i>		X		X	X	X						X			X	X	X	X	X	X	X	X	X
<i>Stachys arvensis</i>										X													
<i>Templetonia retusa</i>				X	X																		
<i>Thomasia cognata</i>																						X	
<i>Trachyandra divaricata</i>							X	X	X		X	X		X	X		X				X	X	X
<i>Trachymene pilosa</i>	X	X				X	X										X			X	X		