# FLORA AND VEGETATION SURVEY

## SOUTH THOMSON AND KINGSTOWN, ROTTNEST ISLAND (WADJEMUP)

## THE ROTTNEST ISLAND AUTHORITY

## SEPTEMBER 2022

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# EXECUTIVE SUMMARY

Focused Vision Consulting Pty Ltd (FVC) was commissioned by the Rottnest Island Authority (RIA) to undertake a flora and vegetation survey with particular emphasis on potential Threatened Ecological Communities and Threatened or Priority flora of Rottnest Island (Wadjemup) within the South Thompson and Kingstown areas.

The scope of work included a single-phase, detailed flora and vegetation survey during autumn, assessing three areas, with associated reporting and data delivery.

A single phase, detailed flora and vegetation field assessment was carried out in the study area by experienced botanists on 2 May 2022.

The key findings and conclusions arising from the flora and vegetation assessment within the study area were as follows:

- No Threatened flora listed under the *Biodiversity Conservation Act 2016* (BC Act) or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were recorded.
- No Priority species listed by the Department of Biodiversity, Conservation and Attractions (DBCA) were recorded.
- No weeds listed as Weeds of National Significance (WoNS) or Declared Pest (DP) plants under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) were recorded.
- The condition of the vegetation was found to range from 'Excellent' to 'Completely Degraded - Degraded' with the greatest proportion in 'Good' condition.
- Nine vegetation units and three other classifications (Beach, Planted and Cleared areas) were defined and mapped within the study area.
- Two of the recorded vegetation units were determined to be characteristic of the State-listed *Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands, Swan Coastal Plain Threatened Ecological Community (TEC) (*Callitris preissii - Melaleuca lanceolata* forests and woodlands TEC).
- The remaining extent of the one vegetation association supported by the study area falls below the 10% retention target in the context of the Swan Coastal Plain, and two vegetation associations relevant to the study area represented by less than 30% of pre-European extent across the Swan Coastal Plain and Perth IBRA sub-region.
- Vegetation units MlAp and CpMl are considered to be representative of the State-listed *Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands TEC (FCT 30a), and therefore, these units are considered to be of State significance.
- Rottnest Island (Wadjemup) is an A Class Reserve and an ESA, therefore all vegetation it supports is considered to be of State and regional significance.
- Vegetation units MlAp, CpMl, TiSS, LpAl and SlG are representative of pre-European vegetation associations and/or complexes that have less than 30% of their original extent remaining and are therefore considered regionally significant.
- Vegetation units GtS, LpAp and SlG occur as small, isolated communities, and are therefore considered locally significant.
- Vegetation units CpMl and GtS are limited in their local extent and/or distribution, and are therefore, considered locally significant.
- Since *Lepidium puberulum* (Priority 4) has previously been recorded within the study area, and since this species would only be observable during late winter and spring, where clearing impacts may be proposed within areas of suitable habitat (sandy soils associated with limestone), further targeted surveys would be appropriate.

# 1 INTRODUCTION

*The Rottnest Island Authority respects the Whadjuk people as the traditional custodians of Wadjemup (Rottnest Island).*

## 1.1 BACKGROUND

Rottnest Island (Wadjemup) is governed by the *Rottnest Island Authority Act 1987* (RIA Act), which establishes the Rottnest Island Authority (RIA) as a statutory body to control and manage the island.

Focused Vision Consulting Pty Ltd (FVC) was commissioned by RIA for a targeted and reconnaissance flora and vegetation assessment, with particular emphasis on potential Threatened Ecological Communities (TECs) and Threatened or Priority flora within the South Thomson and Kingstown areas. The survey results may be utilised for future Environmental Impact Assessments (EIA) and were required to be conducted as per the *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a).

## 1.2 LOCATION

The study area is located within the South Thomson and Kingstown areas of Rottnest Island, which is located on an offshore island, approximately 18 kilometres (km) west of Fremantle. Rottnest Island (Wadjemup) is part of the City of Cockburn. The survey areas were separated into three, as shown in **Figure 1**, which are collectively referred to as the study area in this report.

## 1.3 SCOPE OF WORK

The scope of work required to be fulfilled for the study area was as follows:

- Flora and vegetation desktop assessment, in accordance with the *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment* (Western Australian Environmental Protection Authority (EPA) 2016a)
- Undertake a survey, incorporating:
    - an autumn reconnaissance assessment in accordance EPA (2016a) across the full area extent/s to identify, describe and map general flora species, vegetation communities and vegetation condition
    - opportunistic targeted survey for Threatened and Priority flora
    - determination of the presence of potential Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs) and mapping of their extent, with a particular focus on Floristic Community Type (FCT) 30a
- Prepare a report that presents the desktop and field assessment findings, prepared in accordance with EPA (2016a)
- Preparation of an Index of Biodiversity Surveys for Assessment (IBSA)-compliant package of spatial data.


**Figure 1 - Survey Areas**

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# 2 LEGISLATIVE CONTEXT

The flora and vegetation assessment was conducted in accordance with the following legislation:

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

The assessment complied with the requirements for environmental survey and reporting in Western Australia, as outlined in:

- EPA (2008) *Guidance Statement No. 33: Environmental Guidance for Planning and Development*
- EPA (2016a) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*
- EPA (2016b) *Environmental Factor Guideline – Flora and Vegetation*.

Survey methodology guidance for targeted flora searches was also taken from:

- Commonwealth of Australia (2013) *Survey Guidelines for Australia's Threatened Orchids*.

## 2.1 THREATENED AND PRIORITY FLORA

The Department of Biodiversity, Conservation and Attractions (DBCA) assigns conservation status to endemic plant species that are geographically restricted to few known populations or threatened by local processes. Allocating conservation status to plant species assists in protecting populations and conserving species from potential threats (DBCA 2019).

The BC Act provides a statutory basis for the listing of threatened ecological communities (TECs), threatened and specially protected species, critical habitat and key threatening processes. Whilst not awarded any statutory protection, the DBCA maintains the Priority flora list, for species of conservation concern. Therefore, both Threatened and Priority flora are important focuses of flora and vegetation surveys and their definitions are presented in **Table 1**.

**Table 1 - Definitions of Threatened and Priority Flora Species (DBCA 2019)**

| Conservation Code | Category |
|---|---|
| **T** | **Threatened Species**<br>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 BC Act.<br>Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice for Threatened Flora. |
| **P1** | **Priority 1 – Poorly Known Species**<br>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. |
| **P2** | **Priority 2 – Poorly Known Species**<br>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. |
| **P3** | **Priority 3 – Poorly Known Species**<br>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 are in need of further survey. |
| **P4** | **Priority 4 – Rare, Near Threatened and other species in need of monitoring**<br>(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.<br>(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.<br>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy. |

Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of national environmental significance (MNES) require approval from the Federal Minister for the Environment. Species at risk of extinction are recognised as Threatened at a Commonwealth level and are categorised according to the EPBC Act as summarised in **Table 2**.

**Table 2 - Categories of EPBC Act Threatened Flora Species**

| Conservation Code | Category |
|---|---|
| **EX** | **Extinct**<br>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). |
| **EW** | **Extinct in the Wild**<br>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).<br>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. |
| **CR** | **Critically Endangered**<br>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".<br>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. |
| **EN** | **Endangered**<br>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".<br>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. |
| **VU** | **Vulnerable**<br>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".<br>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. |

Any species listed in State and Commonwealth legislation as being of conservation significance is broadly considered to be a significant species. This incorporates species that are endangered, vulnerable and rare or covered by international conventions. Significance is not limited to species covered by State and Commonwealth legislation that also includes species of local significance and species showing significant range extensions or at the edge of their known range.

## 2.2 THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

TECs are naturally occurring biological assemblages that occur in a particular type of habitat, which are subject to processes that threaten to destroy or significantly modify the assemblage across its range (DEC 2007).

The Minister may list an ecological community as a TEC in one of the following categories: Presumed Totally Destroyed (PD), Critically Endangered (CR), Endangered (EN) or Vulnerable (VU). A publicly available database, listing TECs within Western Australia (WA) is maintained by DBCA.

TECs in WA are protected under the State BC Act and some are also protected under the Commonwealth EPBC Act. The TECs on the Commonwealth register are also listed on the Department of Climate Change, Energy, the Environment and Water (DCCEEW) website, and in the Protected Matters Database (DCCEEW 2022a, 2022b).

Additional to TECs, ecological communities that are considered to be potentially of conservation significance (and potentially TECs) that do not currently meet survey criteria or that are not adequately defined, are rare but not threatened, have been recently removed from the TEC list or require regular monitoring, are considered to be Priority Ecological Communities (PECs) (DEC 2013) and are also required to be taken into consideration during environmental impact assessments (EPA 2016b).

## 2.3 VEGETATION OF SIGNIFICANCE

Alongside and in addition to significance according to statutory listings, vegetation may be considered significant at a National, State, regional or local level. Whilst not applicable to statutory protection, vegetation significance is an important consideration in the environmental impact assessment process.

### 2.3.1 Nationally Significant Vegetation

Vegetation communities may be considered to be of National significance where they support the following Commonwealth listed Matters of National Environmental Significance (MNES):

- Populations of Threatened (EPBC listed) species
- TECs listed as nationally (EPBC) significant
- RAMSAR Wetlands of International Importance (DCCEEW 2022a).

### 2.3.2 State Significant Vegetation

Vegetation communities may be considered to be of State significance where they:

- Support State listed Threatened flora, fauna and TECs afforded protection under the BC Act (EPA 2008, WALGA 2004)
- Occur within the State-managed conservation estate (areas protected under the *Conservation and Land Management Act 1984* (CLM Act)) or areas that have been formally recommended by DBCA for inclusion in the State conservation estate (EPA 2008).

### 2.3.3 Regionally Significant Vegetation

Vegetation communities may be considered to be of regional significance where they:

- Support populations of Priority Flora or ecological communities (EPA 2016b, Government of Western Australia 2000a)
- Are formally protected or recognised as Environmentally Sensitive Areas (ESAs), or under planning schemes for conservation, such as Bush Forever (EPA 2008, WALGA 2004)
- Support conservation category wetlands including associated vegetation (Government of Western Australia 2000a)
- Maintain important ecological processes (EPA 2016b)
- Contain flora species exhibiting range extensions and undescribed species (EPA 2016b)
- Have a restricted regional distribution (EPA 2016b)
- Are represented by less than 30% of their pre-European extent (Commonwealth of Australia 2001).

### 2.3.4 Locally Significant Vegetation

Vegetation communities may be considered to be locally significant where they:

- Occur as small, isolated communities (Government of Western Australia 2000b, WALGA 2004)
- Have a restricted local extent (proportion) (EPA 2016b) and/or are locally restricted to only one or a few locations (WALGA 2004).

## 2.4 VEGETATION CLEARING, EXTENT AND STATUS

Clearing of native vegetation is regulated in WA under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. Any clearing of native vegetation is an offence, unless carried out under a clearing permit or if the clearing is for an exempt purpose (Department of Water and Environmental Regulation (DWER 2022). A clearing permit may be required under Part V of the EP Act, whereby permit applications to clear native vegetation must be assessed against the '10 Clearing Principles' as outlined in the regulations (DER 2019).

Where clearing of native vegetation is proposed to occur, there are several key criteria applied to the assessment of clearing permit applications, in the interests of biodiversity conservation (DER 2019).

The objective of the EPA in relation to flora and vegetation is 'to protect flora and vegetation so that biological diversity and ecological integrity are maintained' (EPA 2016a). This objective is documented in the EPA Factor Guideline - Flora and Vegetation (EPA 2016a). The EPA considers it is important that ecological communities are maintained above the threshold level of 30% of the original pre-clearing extent of the community in unconstrained areas and 10% within 'constrained' areas (EPA 2008).

## 2.5 ENVIRONMENTALLY SENSITIVE AREAS

Environmentally Sensitive Areas (ESAs) are areas that require special protection due to aspects such as landscape, fauna or historical value and are generally considered to be areas of high conservation value. ESAs are declared in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, which was gazetted on 8 April 2005 (Minister for the Environment 2005).

There are several types of ESAs relating to flora and vegetation, declared under Part V of the EP Act, which include:

- a defined wetland and the area within 50 m of that wetland
- the area covered by vegetation within 50 m of rare (Threatened) flora, to the extent where the vegetation is continuous with the vegetation in which the rare (Threatened) flora is located
- the area covered by a TEC
- Bush Forever sites.

## 2.6 INTRODUCED FLORA

Over 1,200 introduced (weed) species have been recognised to occur within Western Australia (EPA 2007). Weeds are plants that are not indigenous to an area and have been introduced either directly or indirectly through human activity. They establish in natural ecosystems and adversely modify natural processes, have the potential to dominate and simplify the ecosystems and thus decrease habitat value provided for native fauna. Weeds pose a threat to many native flora species due to their ability to rapidly grow and out-compete for available water, space, sunlight, and nutrients (EPA 2007).

### 2.6.1 Weeds of National Significance

Under the Australian Weed Strategy 2017-2027, there are currently 32 weed species listed as Weeds of National Significance (WoNS) (Commonwealth of Australia 2017). Each weed listed was considered for inclusion based on the following criteria:

- invasive tendencies
- impacts
- potential for spread
- socioeconomic and environmental values.

### 2.6.2 Declared Pest Plants

The Western Australian Organism List (WAOL) details organisms listed as Declared Pests, including pest plants, under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) (Department of Primary Industries and Regional Development (DPIRD 2022)). Under the BAM Act, Declared Pests are listed under one of the following categories:

- **C1 (exclusion)**, that applies to pests not established in Western Australia; control measures are to be taken to prevent their entry and establishment
- **C2 (eradication)**, that applies to pests that are present in Western Australia but in low numbers or in limited areas where eradication is still a possibility
- **C3 (management)**, that applies to plants that should have some form of management applied that will alleviate the harmful impacts of the plant, reduce the numbers or distribution of the plant, or prevent or contain the spread of the plant (DPIRD 2017).

### 2.6.3 Environmental Weeds

Introduced species have also been ranked by a number of attributes, including invasiveness, distribution and environmental impacts in the various regions in the *Environmental Weed Strategy* (Department of Conservation and Land Management (CALM) 1999). To advance the above categorisation, the Invasive Plant Prioritisation Process for DBCA was developed in 2008 (DPAW 2013).

# 3 EXISTING ENVIRONMENT

## 3.1 CLIMATE

Rottnest Island (Wadjemup) has a temperate Mediterranean climate which is characterised by mild dry, warm summers and moderate seasonality. Rottnest Island (Site Number 009193) is one of the Bureau of Meteorology (BoM) meteorological recording stations, located approximately 4.5 km from the study area and which has been recording since 1983. The site has recorded an average annual rainfall of 567.7 mm and annual mean maximum temperatures ranging from 17.8°C in winter to 27.3°C in summer (BoM 2022) (**Figure 2**). The summer months preceding the field survey (January to March 2022), were recorded to be hotter and drier than the long-term average; however, the month prior to field survey (April) experienced average temperatures and 23.6 mm more rain than the monthly average (**Figure 2**).

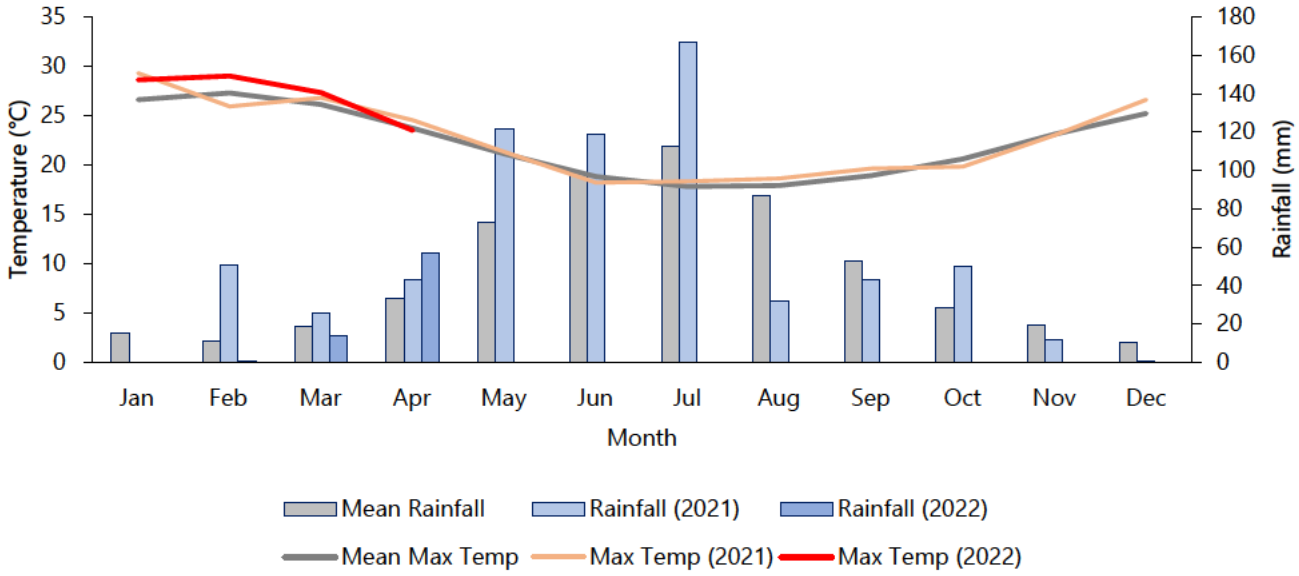


**Figure 2 - Climate Data for Perth Metro Weather Station (009193) (BoM 2022)**

## 3.2 IBRA REGION

There are 89 recognised Interim Biogeographic Regionalisation for Australia (IBRA) regions across Australia that have been defined based on climate, geology, landforms and characteristic vegetation and fauna (DCCEEW 2022c). The study area lies within the Swan Coastal Plain (SWA) IBRA region and, at a finer scale, within the Perth subregion (SWA2) (Mitchell *et al.* 2002).

The Swan Coastal Plain bioregion is a low lying coastal plain, mainly covered with Banksia and Tuart (*Eucalyptus gomphocephala*) woodlands on sandy soils. The Perth subregion is composed of colluvial and aeolian sands, alluvial river flats, coastal limestone, as well as heath and/or Tuart woodlands on limestone, Banksia and Jarrah (*Eucalyptus marginata*) - Banksia woodlands on Quaternary marine dunes of various ages, Marri (*Corymbia calophylla*) on colluvial and alluvials (Mitchell *et al.* 2002).

## 3.3 SOILS

The Swan Coastal Plain supports five major geomorphological systems (landforms) that lie parallel to the coast. From west to east these five systems include; the Quindalup Dunes, Spearwood Dunes, Bassendean Dunes, Pinjarra Plain and Ridge Hill Shelf (Churchward and McArthur 1980; Gibson *et al.* 1994). The study area is situated on the Quindalup South System (211Qu) and developed from Tamala Limestone (Playford 1988) (**Table 3**). The spatial extent of this system is presented in **Figure 3**.

**Table 3 - Summary of Soil Systems within the Study Area (Schoknecht *et al.* 2004)**

| System | Soil Unit | Description |
|---|---|---|
| Quindalup South System | 211Qu | Coastal dunes, of the Swan Coastal Plain, with calcareous deep sands and yellow sands. Vegetation consists of coastal scrub. |

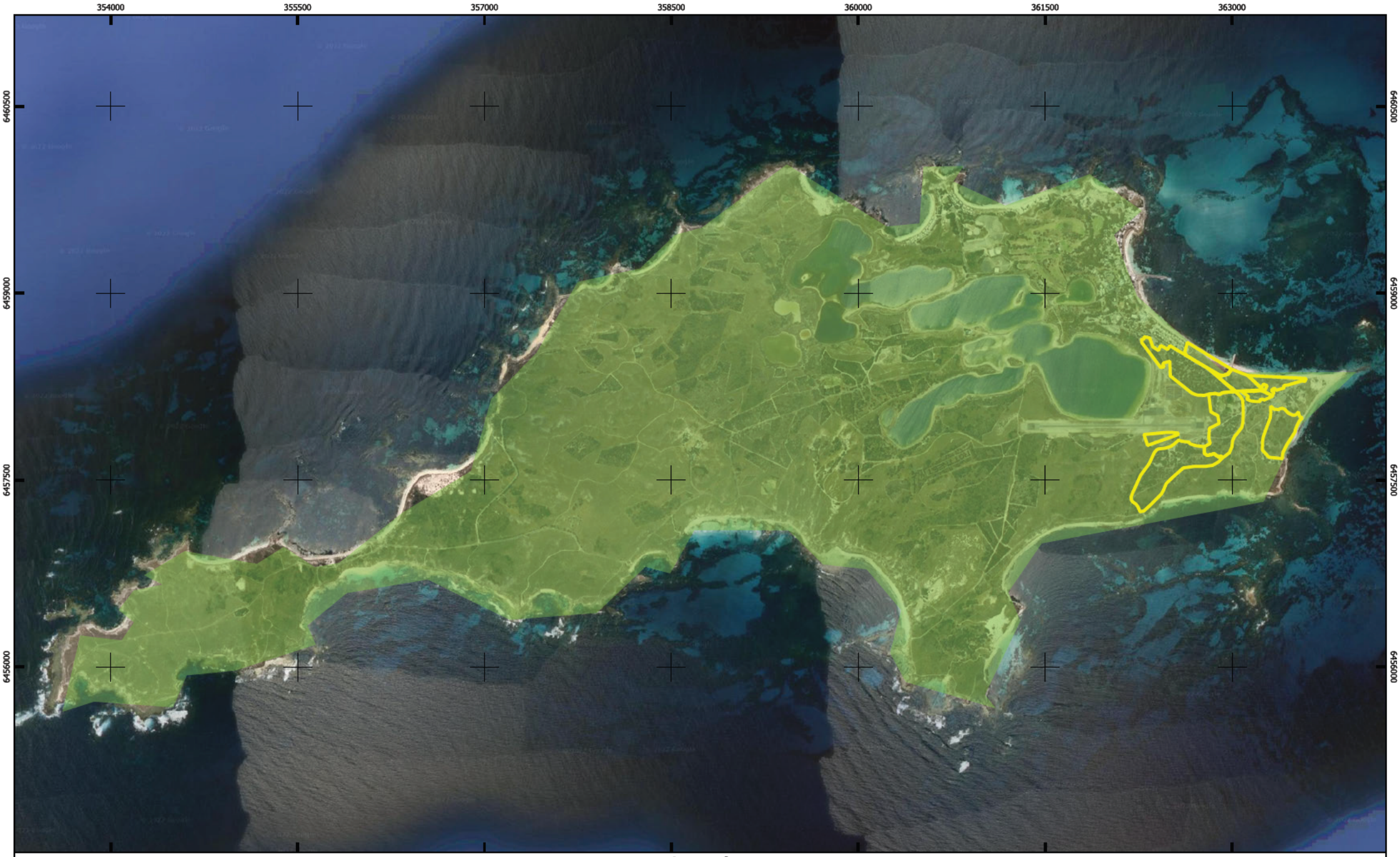


**Figure 3 - Soils**

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## 3.4 VEGETATION

The study area is located on the Swan Coastal Plain and has been broadly characterised by Beard (1990). The Beard vegetation associations supported by the study area and the remaining extent across a range of contexts are presented in **Table 4** and spatially in **Figure 4**.

**Table 4 - Pre-European Vegetation of the Study Area (Beard 1990, DBCA 2018)**

| Extent Context | Vegetation System Association | Broad Vegetation Description | Pre-European Extent (Ha) | Current Extent (ha) | Pre-European Extent Remaining (%) | Current Extent in DBCA Managed Lands (%) |
|---|---|---|---|---|---|---|
| Western Australia | 15 | Low forest; cypress pine | 2,374.16 | 1,576.52 | 66.40 | 37.34 |
| | 125 | Bare areas; salt lakes | 3,485,785.49 | 3,146,487.22 | 90.27 | 7.62 |
| | 1007 | Mosaic Shrublands: *Acacia lasiocarpa* and *Melaleuca acerosa* Heath / *Acacia rostellifera* and *Acacia cyclops* thicket | 30,407.75 | 20,691.11 | 68.05 | 10.04 |
| Swan Coastal Plain IBRA Region | 15 | Low forest; cypress pine | 17,364.58 | 3,150.77 | 18.14 | 2.11 |
| | 125 | Bare areas; salt lakes | 136,188.20 | 9,017.32 | 6.62 | 1.43 |
| | 1007 | Mosaic Shrublands: *Acacia lasiocarpa* and *Melaleuca acerosa* Heath / *Acacia rostellifera* and *Acacia cyclops* thicket | 30,109.89 | 20,679.62 | 68.68 | 10.13 |
| Perth IBRA Subregion | 15 | Low forest; cypress pine | 1,977.93 | 1,564.26 | 79.09 | 44.66 |
| | 125 | Bare areas; salt lakes | 9,401.12 | 1,948.17 | 20.72 | 11.70 |
| | 1007 | Mosaic Shrublands: *Acacia lasiocarpa* and *Melaleuca acerosa* Heath / *Acacia rostellifera* and *Acacia cyclops* thicket | 30,109.89 | 20,679.62 | 68.68 | 10.13 |
| City of Cockburn | 15 | Low forest; cypress pine | 1,353.14 | 886.49 | 65.51 | 65.51 |
| | 125 | Bare areas; salt lakes | 166.17 | 53.27 | 32.06 | 29.66 |
| | 1007 | Mosaic Shrublands: *Acacia lasiocarpa* and *Melaleuca acerosa* Heath / *Acacia rostellifera* and *Acacia cyclops* thicket | 337.86 | 271.35 | 80.32 | 80.32 |

Cells highlighted grey indicate vegetation associations with less than 30% extent remaining
Cell highlighted yellow indicates vegetation association with less than 10% extent remaining

Vegetation complexes within the study area have also been defined by Heddle *et al.* (1980) and are based on vegetation in association with landforms and underlying geology. Only the Quindalup Complex occurs within the study area and this complex is described as coastal dune consisting 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 pre-European extent and current known extent of this complex is listed in **Table 5**.

**Table 5 –Vegetation Complexes Within the Study Area (Heddle *et al.* 1980)**

| Extent Context | Vegetation Complex | Pre-European Extent (Ha) | Current Extent (ha) | Pre-European Extent Remaining (%) | Current Extent in DBCA Managed Lands (%) |
|---|---|---|---|---|---|
| Swan Coastal Plain | Quindalup Complex | 54,573.87 | 33,011.64 | 60.49 | 10.98 |
| City of Cockburn | Quindalup Complex | 1,021.62 | 728.23 | 71.28 | 1.87 |

The objective of the EPA in relation to flora and vegetation is: *To protect flora and vegetation so that biological diversity and ecological integrity are maintained* (EPA 2016a). The EPA considers it is important that vegetation associations are maintained above a threshold level of 30% for unconstrained areas and 10% for constrained areas (which includes the Perth metropolitan area), of the original pre-clearing extent of each association (EPA 2008). A level of 30% pre-clearing extent is considered to be the level below which species loss appears to accelerate exponentially at the ecosystem level (EPA 2008).

The following key criteria are applied to vegetation clearing from a biodiversity perspective, which justifies the retention targets (EPA 2000):

- The 'threshold level' below which species loss appears to accelerate exponentially within an ecosystem level, is regarded as being at a level of 30% (of the pre-European, i.e. pre-1750 extent of the vegetation type).
- A level of 10% of the original extent of a vegetation community is regarded as being a level representing Endangered.
- Clearing which would increase the threat level to a vegetation community should be avoided.

The remaining extent of all three Beard (1990) vegetation associations exceed the 30% threshold within Western Australia (**Table 4**). Within the Swan Coastal Plain IBRA region; vegetation associations 15 (Low forest; cypress pine) and 125 (Bare area; salt lakes) have remaining extents of 18.14% and 6.62%, respectively. This indicating that both associations fall below the 30% threshold and vegetation association 125 also falling below the 10% threshold. Within the Perth IBRA subregion, vegetation association 125 exhibits a remaining extent of 20.72%, not meeting the 30% threshold.

The remaining extent for the Heddle *et al.* (1980) Quindalup complex exceeds 30% threshold for the Swan Coastal Plain IBRA region and City of Cockburn extents (**Table 5**).

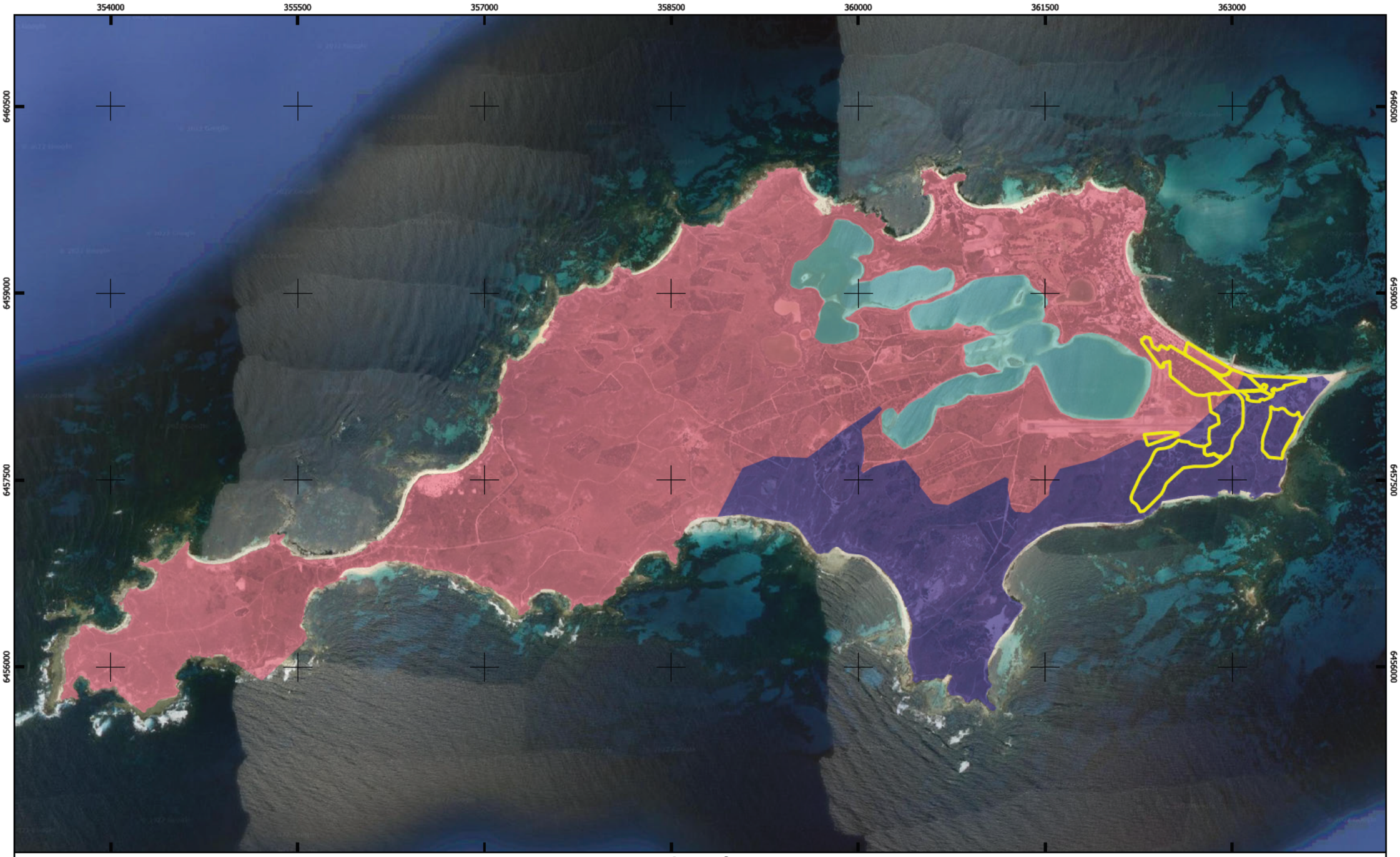


**Figure 4 - Pre-European Vegetation**

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# 4 METHODOLOGY

## 4.1 DESKTOP REVIEW

The desktop assessment consisted of database searches for significant flora and ecological communities based on a central point within the study area (115°32'49.9" E, 32°00'18.9" S) with a 5 km buffer, hereafter referred to as the desktop assessment area. Database searches included the DBCA Threatened and Priority flora records (DBCA 2022a), NatureMap (DBCA 2022b) (**Appendix A**), the Commonwealth DCCEEW Protected Matters Search Tool (PMST) (DCCEEW 2022b) for Matters of National Environmental Significance (MNES) (**Appendix B**) and the DBCA Threatened and Priority Ecological Communities records (DBCA 2021c).

The database search results were compiled into a table that concluded the likelihood of occurrence of each of the significant species and communities based on habitat preferences of known recorded locations for each species. The likelihood of all significant flora occurring within the study area was assessed based on known records and their age (currency) and proximity to the study area, and the presence of suitable habitat within the study area. Based on this assessment, each species was given a likelihood of occurrence category of 'likely' to occur, 'may occur' or 'unlikely' to occur. Where recent records and suitable species habitat occurs within or near the study area, these species were given a category of 'likely to occur', whilst species occurring a greater distance from the study area with limited suitable habitat, or for very old records, a category of 'unlikely to occur' or 'may occur' was applied, depending on record relevance.

## 4.2 FIELD ASSESSMENT

A reconnaissance flora and vegetation field assessment was carried out within the study area on 2 May 2022, by Principal Ecologist, Kellie Bauer-Simpson and Senior Botanist, Lisa Chappell, in accordance with EPA (2016a).

Within areas that were considered to potentially be representative of TECs or PECs, a targeted survey was carried out via the sampling of quadrats. During sampling, a temporary peg was installed to mark the north-west corner while marking out quadrats within measuring tapes, and when sampling was complete, the peg was removed. Quadrat dimensions were 10 m x 10 m in accordance with the Technical Guidance (EPA 2016a). Detailed data collection points (relevés) were recorded where vegetation was not considered to be a TEC or PEC and to inform vegetation mapping. During the survey vegetation, data from five quadrats and seven relevés were recorded, with their location visually represented in **Figure 5**.

The following information was collected at each quadrat and relevé:

- observer
- date
- GPS location (MGA94)
- representative photograph
- soil type and colour
- topography
- vegetation condition/degradation/disturbances (e.g. grazing, weed invasion, fire)
- flora species observed, including average height and projected foliage cover of dominant species within each stratum
- vegetation community, described in accordance with Level 5 of the National Vegetation Information System (NVIS) (DEH 2003)
- vegetation condition, assessed against the currently accepted scale; an adaptation of the Keighery (1994) condition scale.

Selective targeted searching for Threatened and Priority flora was carried out while traversing the study area and track logs of all personnel were captured using GPS-enabled devices to demonstrate survey effort. These combined track logs for the study area are presented in **Figure 6**.

The flora and vegetation data collected during assessment, from the combination of quadrats, relevés and continuous opportunistic observations, contributed to the flora inventory for the study area. The vegetation units of the study area have been defined by data collected within quadrats and relevés and opportunistically between, and how they relate to other environmental features such as soil type and landform. A map of the vegetation units was then developed using GIS and is presented in **Section 5.2.2**.

Vegetation condition was assessed using the current bushland condition scale, which is an adaptation of Keighery (1994) scale, as described in EPA (2016a).

All field data was recorded using electronic tablets equipped with the mobile mapping software, Mappt™ and customised data collection forms, tailored to the electronic collection of quadrat data and targeted flora surveys. Draft vegetation unit and condition mapping were also prepared in shapefiles directly into Mappt™ whilst in the field, and this formed the basis of the mapping presented in this report and provided in spatial data.

Quadrat data was then subject to floristic analysis to detect similar vegetation within the study area and also in comparison to relevant reference data (Gibson *et al.* 1994 and Keighery *et al.* 2012), in order to infer FCTs. The floristic analysis was first carried out for all quadrats sampled (batch analysis) and then for each quadrat individually (single site insertion (SSI)).


**Figure 5 - Quadrat and Relevé Locations**

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**Figure 6 - Targeted Flora Search Traverses**

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## 4.3 SURVEY LIMITATIONS

The current assessment was assessed against limitations imposed by many variables as outlined in the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a) (**Table 6)**.

**Table 6 – Potential Survey Limitations and Constraints**

| Aspect | Constraint? | Commentary |
|---|---|---|
| Availability of regional data, previously available information | No | A wealth of data, literature and other information is available for sites within the Perth metropolitan area, such as the study area. DBCA database search results are evidence of the high volume of records that exist for the study area and surrounds. |
| Scope (detail) | No | A single-phase, detailed flora and vegetation assessment was carried out in accordance with EPA (2016a). The EPA Guidelines state that a minimum of three quadrats should be sampled in each vegetation unit considered to be of 'Good' or better condition. Three quadrats were sampled within vegetation in 'Good' or better condition and five relevé were sampled in an area of 'Degraded' or lower vegetation. This level of survey detail was more than adequate for the assessment of floristic values. |
| Competency/Experience of personnel | No | All of the personnel undertaking the field assessment, flora identifications, data analysis, vegetation mapping and reporting are experienced botanists, with specialist skills in their respective fields. All botanists have a minimum of 14 years' experience with a significant proportion of which have been on the Swan Coastal Plain. |
| Survey effort/detail/intensity | No | The single-phase, detailed flora and vegetation assessment was considered adequate to determine the floristic values within the study area. Three quadrats were sampled within vegetation in 'Good' or better condition and five relevés were sampled in an area of 'Degraded' or lower vegetation. All quadrats and relevés were sampled during May 2022. |
| Seasonal timing and climatic conditions | Yes | The flora and vegetation field assessment was not conducted during the optimal spring season for biological surveys on the Swan Coastal Plain. Some annual species are less likely to be present outside their optimal survey period. In the months preceding the May field assessment, February (particularly) and March experienced drier and hotter seasonal conditions than average; however, April experienced 4 mm more rainfall than the average. These conditions, although variable from long-term averages, are generally representative of the Perth Metropolitan summer / autumn climatic conditions. |
| Access | No | The entire study area was mostly easily accessible on foot (except where extremely dense) and was traversed in relatively good detail during May 2022. |
| Mapping reliability | No | The mapping has been prepared at a scale based on ground-truthed areas, with limited extrapolation given the good accessibility of the study area. Therefore, mapping reliability is considered high. |
| Disturbances | No | Numerous tracks bisect the study area, which have high foot and bicycle traffic, plus some vehicular access on suitable tracks. The disturbances are considered to be a minor constraint for the survey. Due to the degraded condition of some sections of the study area, one of the vegetation units was only able to be sampled with three quadrats. |
| Survey completeness | No | Most areas were easily accessible and data and other information for the regional is abundant. The field surveys for the current study were all able to be completed for the entire study area and in thorough detail. |

# 5 RESULTS AND DISCUSSION

## 5.1 DESKTOP ASSESSMENT

### 5.1.1 Threatened and Priority Flora

The DBCA database search (incorporating Western Australian Herbarium (WAH) records), NatureMap Species Report and the DCCEEW PMST conducted for the study area determined that five species of Threatened and Priority flora that have the potential to occur within a 10 km radius of the study area (**Table 7**). The list of conservation significant species comprised one Commonwealth and State-listed Vulnerable (Threatened) flora, two Priority (P) 1 and two Priority 4 species, and all are annual or short-lived perennial species, emerging and flowering in spring.

Of these five species, four have been previously recorded on Rottnest Island, and have previous known locations within the study area or within 3 km (**Figure 7**). One species, *Lepidium puberulum* (P4) has been previously recorded within the study area and has therefore been determined to be 'likely' to occur. The remaining three species that have been previously recorded on the island were determined to 'possibly' occur, and the fifth species, not known to occur on the island, was determined to be 'unlikely' to occur.

**Table 7 - Threatened and Priority Flora with the Potential to occur within the Study Area**

| Species | EPBC Act Conservation Status | BC Act/DBCA Conservation Status | Description | Preferred Habitat | Likelihood of Occurrence | Source of Record |
|---|---|---|---|---|---|---|
| *Diuris micrantha* | Vulnerable | Vulnerable | Tuberous, perennial orchid growing to 0.3-0.6 m high with a basal tuft of narrow, linear leaves. Produces up to 7 yellow flowers with red-brown markings from August to October. | Brown/black sandy clay-loam and clayey soils. Winter-wet depressions and swamps, in shallow water. | **Unlikely**. Four previous records approx. 38 km SE of the study area, on the mainland. | PMST |
| *Lachnagrostis nesomytica* subsp. *nesomytica* | | Priority 1 | Loosely tufted, annual or short-lived perennial grass growing to 0.2 m high. Produces purple-green flowers known from November (likely longer period). | Peat and loam soils. Edges of salt lakes, marshes and drainage areas. | **Possible**. Two previous records in possibly similar habitat within 2.8 km, W of the study area. | DBCA, NatureMap |
| *Lachnagrostis nesomytica* subsp. *pseudofiliformis* | | Priority 1 | Loosely tufted, annual or short-lived perennial grass growing to 0.3-0.5 m high. Produces purple-green flowers, flowering period unknown. | Grey-brown sand, peaty soils. Coastal areas, edges of saline lakes on Garden Island. | **Possible**. Three previous records in likely similar habitat 700 m to 1.7 km W of the study area. | DBCA, NatureMap |
| *Lepidium puberulum* | | Priority 4 | Erect annual herb growing to 0.4 m high. Produces greenish white flowers from July to November. | Sandy soil. Coastal areas, islands, often associated with limestone. | **Likely**. One previous record within the study area. | DBCA, NatureMap |
| *Myosotis australis* | | Priority 4 | Erect to procumbent annual herb growing to 0.3 m high. Produces blue-white flowers from August to November. | Sandy soil. Coastal dunes and swales often associated with limestone. | **Possible**. Two previous records within 1.7 km SW from the study area is possibly similar habitat. | DBCA/WAH, NatureMap |


**Figure 7 - DBCA Priority Flora**

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### 5.1.2 Threatened and Priority Ecological Communities

A review of DBCA's Threatened and Priority Ecological Communities (TEC and PEC) database and the EPBC Protected Matters Search Tool identified that one TEC and six PECs occur within a 5 km buffer of the study area (DBCA 2022c, DCCEEW 2022b) (**Table 8**). Of these, five are Microbial communities and are not of conservation-significance due to flora and vegetation values, therefore, these communities are not discussed further in this report. The known extent of the two floristic communities of relevance to flora and vegetation values, SCP 30a and SCP 29a, are presented in **Figure 8**.

**Table 8 – Threatened and Priority Ecological Communities Occurring within the Study Area**

| Abbreviated Identifier | Community Name | Commonwealth Category | State Category |
|---|---|---|---|
| Floristic Communities | | | |
| SCP 30a | *Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands, Swan Coastal Plain (FCT 30a (Gibson *et al.* 1994) | - | Vulnerable |
| SCP29a | Coastal shrublands on shallow sands | - | Priority 3 |
| Microbial Communities | | | |
| Rottnest Island Microbial - Garden | Microbialites and microbial mats of coastal hypersaline lakes (Rottnest Island). Community 5 - Garden Lake | - | Priority 1 |
| Rottnest Island Microbial - Serpentine | Rottnest Island Microbial Lake community 1 - Serpentine Lake | - | Priority 1 |
| Rottnest Island Microbial - Herschel | Microbialites and microbial mats of coastal hypersaline lakes (Rottnest Island). Community 6 - Herschel Lake | - | Priority 1 |
| Rottnest Island Microbial - Baghdad | Microbialites and microbial mats of coastal hypersaline lakes (Rottnest Island); Lake Baghdad | - | Priority 1 |
| Government House Lake Microbial | Hypersaline microbial community 1 (Government House Lake, Rottnest) | - | Priority 2 |

#### 5.1.2.1 *SCP 30a – Rottnest Island Pine (Callitris preissii) and Tea Tree (Melaleuca lanceolata) TEC*

The Rottnest Island Pine (*Callitris preissii*) and Tea Tree (*Melaleuca lanceolata*) TEC (Rottnest Island Pine and Tea Tree TEC) is listed as 'Vulnerable' under State legislation and is described as a woodland and forest community dominated by *Callitris preissii*, *Melaleuca lanceolata*, *Spyridium globulosum*, *Acanthocarpus preissii*, *Rhagodia baccata*, *Austrostipa flavescens* and *Trachymene pilosa* (Gibson *et al.* 1994). The critical habitat for the Rottnest Island Pine and Tea Tree TEC includes the dunes and swale habitat on which they occur, the fresh superficial groundwater that is likely to provide water to the trees in the community, and the catchment for this groundwater (DPaW 2014).

#### 5.1.2.2 *SCP 29a – Coastal Shrublands on Shallow Sands*

SCP 29a (Coastal Shrublands on Shallow Sands) supports shrublands on shallow sands over limestone, in close proximity to the coast, on the southern Swan Coastal Plain. Landforms are dunes from Supergroup 4; uplands centred on Spearwood and Quindalup Dunes (Gibson *et al.* 1994). Key species include *Spyridium globulosum, Rhagodia baccata* and *Olearia axillaris* (DBCA 2022c).

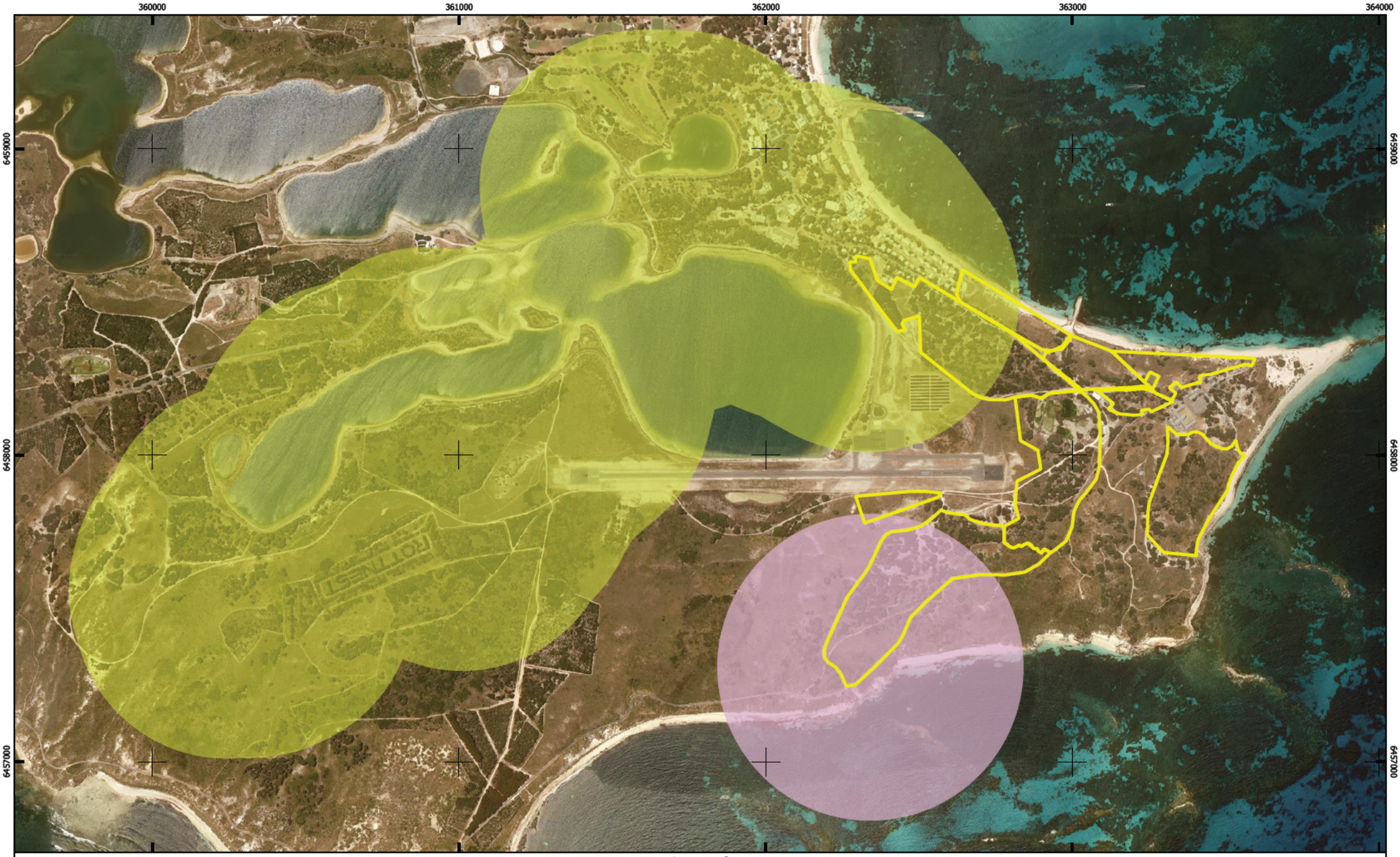


**Figure 8 - Threatened and Priority Ecological Communities**

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## 5.2 FIELD ASSESSMENT

### 5.2.1 Flora

A total of 26 flora taxa, from 25 genera and 15 families was recorded during the field survey. The dominant families were found to be Poaceae (five taxa), Myrtaceae (three taxa) and Cyperaceae (three taxa). The total includes 21 (80.77%) native species and five (19.23%) introduced (weed) species. The average species richness within quadrats was 5.6 species. Four species were recorded in 50% or more of the sample sites (quadrats and relevés), indicating a greater dominance and distribution compared to other species. These species were:

- *Acanthocarpus preissii* (recorded in 75% of sample sites)
- *Melaleuca lanceolata* (recorded in 50% of sample sites
- *Poa poiformis* (recorded in 58% of sample sites
- **Trachyandra divaricarta* (recorded in 67% of sample sites).

The full list of vascular flora species recorded within each vegetation unit and at each sample site is presented in **Appendix C** and individual quadrat and relevé data is presented in **Appendix D**.

No species listed as Threatened or Priority flora under the BC Act or under the EPBC Act were recorded. All five of the potentially occurring Threatened and Priority flora resulting from the desktop assessment are annual or short-lived perennial species, emerging and flowering in spring, and would have been unlikely to be present/visible, flowering or presenting identifiable material at the time of the May field survey.

Since *Lepidium puberulum* (P4) has previously been recorded within the study area, and since this species would only be observable during late winter and spring, where clearing impacts may be proposed within areas of suitable habitat (sandy soils associated with limestone), further targeted surveys would be appropriate.

None of the recorded flora are exhibiting an extension beyond their currently documented range, in accordance with records of the Western Australian Herbarium (WAH 1998-).

No taxa listed as Declared Pest [s22(2)] plants under the BAM Act (DPIRD 2022) were recorded. In addition, none of the weed species recorded are listed as WoNS (Commonwealth of Australia 2017).

### 5.2.2 Vegetation

#### 5.2.2.1 *Vegetation Condition*

The condition of the vegetation within the study area was found to range from 'Excellent' to 'Completely Degraded - Degraded' (**Table 9**). The greatest proportion of the vegetation (31.63%) was observed to be in 'Good' condition. The spatial extent of the varying vegetation condition is presented in **Figure 9**.

**Table 9 - Summary Vegetation Condition within the Study Area**

| Vegetation Condition Rating | Area (ha) | % of Study Area |
|---|---|---|
| Excellent | 1.020 | 1.69 |
| Very Good - Excellent | 0.064 | 0.11 |
| Very Good | 12.417 | 20.59 |
| Good - Very Good | 13.344 | 22.13 |
| Good | 19.074 | 31.63 |
| Degraded - Good | 4.984 | 8.26 |
| Degraded | 4.134 | 6.85 |
| Completely Degraded - Degraded | 2.223 | 3.69 |
| Completely Degraded | 0.00 | 0.00 |
| Cleared | 3.047 | 5.05 |
| **Total** | **60.307** | **100** |

#### 5.2.2.2 *Vegetation Units*

Nine vegetation units and three other classifications (Beach, Planted and Cleared areas) were defined and mapped within the study area as described in **Table 10**. More than half of the study area (56.63%) consists of vegetation unit MlAp (*Melaleuca/Acanthocarpus* Woodland), and vegetation unit MlGl (*Melaleuca/Guichenotia* Shrubland) accounts for 16.12% of the study area.

The remaining seven vegetation units account a total of 21.64 % of the study area. The remaining three classifications (Beach, Planted and Cleared areas) occupy 5.61% of the study area. The spatial extent of the varying vegetation units is presented in **Figure 10**.

**Table 10 - Summary of Recorded Vegetation Units in the Study Area**

| Broad Type | Vegetation Unit | Vegetation Description | Site Number | Area (ha) | % of Study Area |
|---|---|---|---|---|---|
| **Woodland** | **MIAp** *Melaleuca/Acanthocarpus* Woodland | *Melaluca lanceolata* Tall Shrubland over *Acanthocarpos preissii* Low Open Shrubland | Q03, Q06, Q08, Q11 | 34.153 | 56.63 |
| **Shrubland** | **ArAp** *Acacia/Acanthocarpus* Shrubland | *Acacia rostellifera* Tall Open Shrubland over *Acathocarpus preissii* Low Shrubland over *Trachyandara divaricata* Low Sparse Forbland | R01 | 4.050 | 6.72 |
| | **CpMI** *Callitris/Melaleuca* Shrubland | *Callitris priessi* and *Melaleuca lanceolata* Tall Shrubland | Q12 | 0.605 | 1.00 |
| | **MIGI** *Melaleuca/Guichenotia* Shrubland | *Melaeluca lanceolata* and *Callitris preissii* Tall Sparse Shrubland over *Guichenotia ledifolia, Acanthocarpus preissii* and *Rhagodia baccata* Shrubland over *Trachyandara divaricata* Low Sparse Forbland | R02 | 9.722 | 16.12 |
| | **OaAp** *Olearia/Acanthocarpus* Shrubland | *Olearia axillaris* Tall Sparse Shrubland over *Acanthocarpos preissii* Low Open Shrubland | R05 | 2.312 | 3.83 |
| | **TiSS** *Tecticornia* Samphire Shrubland | *Tecticornia indica* subsp. *bidens* Low Samphire Shrubland | R09 | 2.745 | 4.55 |
| **Sedgelands** | **GtS** *Gahnia* Sedgeland | *Gahnia trifida* Tall Sedgeland | R04 | 0.439 | 0.73 |
| | **LpAp** *Lepidosperma/Acanthocarpus* Sedgeland | *Acanthocarpos preissii, Rhagodia baccata* and *Conostylis candicans* Low Open Shrubland over *Lepidosperma gladiatum* Open Sedgeland over *Trachyandara divaricata* Low Sparse Forbland | R07 | 2.091 | 3.47 |
| **Grassland** | **SIG** Spinifex Grassland | *Scaevola crassifolia* Low Open Shrubland over *Spinfex longifolius* Grassland | R10 | 0.811 | 1.34 |
| **Planted** | | Planted non-endemic species | NA | 0.334 | 0.55 |
| **Beach** | | | NA | 0.540 | 0.90 |
| **Cleared** | | | NA | 2.507 | 4.16 |
| | | | **TOTAL** | **60.309** | **100** |


**Figure 9 - Vegetation Condition**

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**Figure 10 - Vegetation Units**

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### 5.2.2.3 *Assessment of Floristic Community Types*

All vegetation units within the study area were sampled and defined from a single relevé, unless they were suspected to be representative of the TEC, FCT 30a. Four quadrats were sampled in vegetation considered to be representative of FCT 30a and in order to analyse the similarity between these quadrats, floristic analysis was carried out in PATN (Belbin 2013). This floristic analysis grouped three of the quadrats, with the fourth (Q12) determined to be floristically dissimilar, as shown in **Figure 11**.

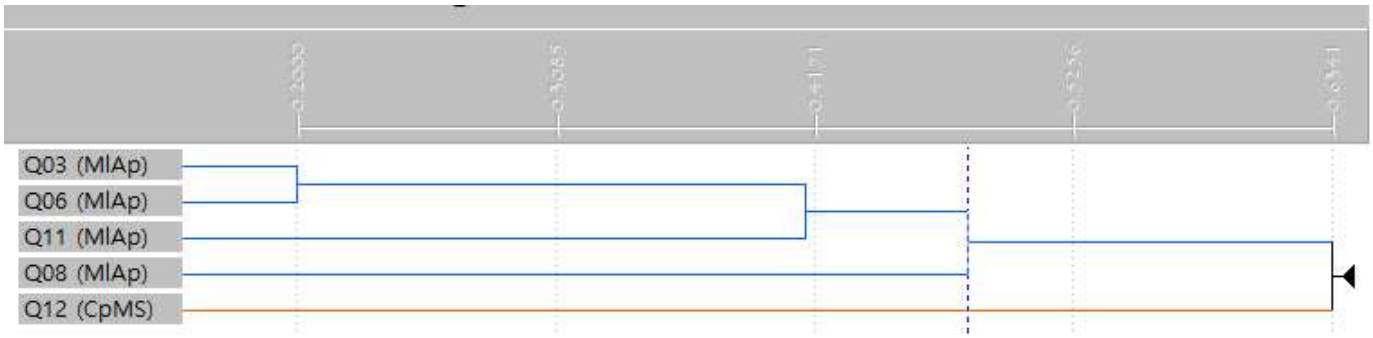


**Figure 11 – Quadrat PATN Analysis Dendrogram**

In order to then infer the FCT/s most likely represented by the sampled quadrats, floristic analysis was carried out, incorporating reference data from the Gibson *et al.* 1994 and Keighery *et al.* 2012 studies. The analysis was first conducted on the full suite of quadrats (batch analysis) and then via SSI, utilising multivariate cluster analysis of species presence/absence in PATN. The dendrograms resulting from the analyses are presented in **Appendix E**, with these results and the results of dissimilarity analyses presented in **Table 11**.

The floristic analysis determined that all sampled quadrats, representative of vegetation units CpMl (one quadrat) and MlAp (four quadrats) are likely representations of FCT 30a.

### 5.2.3 Threatened and Priority Ecological Communities

The TEC, *Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands TEC (FCT 30a) has been previously reported to occur within the study area. The community, also known as the 'Rottnest Island Pine (*Callitris preissii*) and Rottnest Island Tea Tree (*Melaleuca lanceolata*) Woodland' is listed as a 'Vulnerable' TEC under State legislation (RIA 2014). This community is described as a woodland and forest dominated by *Callitris preissii, Melaleuca lanceolata, Spyridium globulosum, Acanthocarpus preissii, Rhagodia baccata*, *Austrostipa flavescens* and *Trachymene pilosa* (Gibson *et al*. 1994). Critical habitat for this community is the sandy soils on which the community occurs and the fresh superficial groundwater that helps to sustain key dominant trees (DPaW 2014).

The survey and analyses carried out for quadrats assessed within the study area, identified that vegetation units MlAp (*Melaleuca/Acanthocarpus* Woodland) and CpMl (*Callitris/Melaleuca* Shrubland) have the greatest similarity to FCT 30a (**Table 11**). A large proportion of the study area (all areas mapped as vegetation units MlAp and CpMl) (**Figure 11**) is therefore considered to be representative of the Vulnerable TEC, FCT 30a, *Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands TEC.

**Table 11 – Summary of Floristic Analysis Results**

| Vegetation Unit | Quadrat | Vegetation Condition | SSI Dendrogram Result* | Ref. Quadrat | FCT | Dissimilarity Value | Ref. Quadrat | FCT | Dissimilarity Value | Ref. Quadrat | FCT | Dissimilarity Value | Inferred FCT | Reasoning |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CpMI** *Callitris/ Melaleuca* SL | Q12 | Very Good | 30a, 30a2, S12 | rott01 | S11 | 0.6842 | WOODP-1 | 30a | 0.6842 | WOODP-1 | 30a | 0.6842 | 30a | Gibson *et al.* (1994) and Keighery *et al.* (2012) quadrats analysed present the same dissimilarity value in comparison to Q12. FCT S11 did not record a dominant species of Q12, *Callitris preissii* and is dominated by *Melaleuca acerosa,* which was absent from Q12. S12 is a sub-type of FCT 30a (DPaW 2014). Key/dominant species of Q12 and FCT 30a align. Greatest similarity to **FCT 30a**. |
| **MIAp** *Melaleuca/ Acanthocarpus* Woodland | Q03 | Good - Very Good | S12, 29a, S11, 30a | rott01 | S11 | 0.6471 | GARD04 | 30a | 0.7273 | GARDEN-4 | 30a2 | 0.7273 | 30a | S11 is 'Northern *Acacia rostellifera – Melaleuca acerosa* shrublands', whilst FCT 30a is '*Callitris preissii* (or *Melaleuca lanceolata*) forest and woodlands'. Q03 does not contain *Acacia rostellifera* or *Melaleuca acerosa* and is therefore not considered representative of FCT S11. Based on the height and cover of canopy species, the vegetation is considered to be a Woodland or forest. FCT 29a is a shrubland, lacking the woodland canopy layer present in Q03. S12 is a sub-type of FCT 30a (DPaW 2014). Key/dominant species of Q03 and FCT 30a align. Greatest similarity to **FCT 30a**. |
| | Q06 | Very Good | S12, S11, 29a, 30a | rott01 | S11 | 0.5789 | rott03 | S12 | 0.6800 | GARD01 | 30a1 | 0.6923 | 30a | S11 is 'Northern *Acacia rostellifera – Melaleuca acerosa* shrublands' and both species are absent from Q06. Based on the height and cover of canopy species, the vegetation is considered to be a woodland or forest. FCT 29a is a shrubland, lacking the woodland canopy layer present in Q06. S12 is a sub-type of FCT 30a (DPaW 2014). Key/dominant species of Q06 and FCT 30a align. Greatest similarity to **FCT 30a**. |
| | Q08 | Good - Very Good | S19, 18, 7 | rott01 | S11 | 0.7778 | rott06 | S12 | 0.7778 | cool 04 | 17 | 0.8182 | 30a | S11 is 'Northern *Acacia rostellifera – Melaleuca acerosa* shrublands' and Q08 did not record either species. *Melaleuca lanceolata,* dominant in Q08 does not occur within FCT 17. S12 is a sub-type of FCT 30a (DPaW 2014). Key/dominant species of Q08 do not align with S19 or FCTs 7 or 18 but do align with FCT 30a. Greatest similarity to **FCT 30a**. |
| | Q11 | Very Good | S11, S12, 30a | rott01 | S11 | 0.5556 | MI11 | 13 | 0.7273 | GARD04 | 30a2 | 0.7391 | 30a | S11 is 'Northern *Acacia rostellifera – Melaleuca acerosa* shrublands' and both species are absent from Q13. FCT 13 is a wetland with key dominant species that do not align with Q13. S12 is a sub-type of FCT 30a (DPaW 2014). Key/dominant species of Q13 and FCT 30a align. Greatest similarity to **FCT 30a**. |

## 5.3 VEGETATION OF SIGNIFICANCE

### 5.3.1 Nationally Significant Vegetation

The National significance of the vegetation units was assessed based on presence of:

- populations of Threatened (EPBC listed) species
- TECs listed as nationally (EPBC) significant
- Ramsar Wetlands of International Importance (DAWE 2020a).

#### 5.3.1.1 *Threatened Flora*

No EPBC-listed Threatened flora were recorded within the study area and therefore, none of the recorded vegetation units are of significance due to this factor.

#### 5.3.1.2 *Threatened Ecological Communities*

No EPBC-listed TECs are considered to occur within the study area. Therefore, none of the defined vegetation units are considered to be of National Significance due to this factor.

#### 5.3.1.3 *Ramsar Wetlands*

No Ramsar wetlands occur within the study area and therefore, none of the recorded vegetation units are of significance due to this factor.

### 5.3.2 State Significant Vegetation

The State significance of the vegetation units was assessed based on presence of:

- State listed Threatened flora
- State listed TECs
- land within (or areas recommended by DBCA for inclusion) the State-managed conservation estate.

#### 5.3.2.1 *Threatened Flora*

No State-listed Threatened flora were recorded within the study area and therefore, none of the recorded vegetation units are of significance due to this factor.

#### 5.3.2.2 *TECs*

Two of the defined unit, MIAp and CpMI, were considered to be representative of or form part of a State-listed TEC. Therefore, these vegetation units are considered to be State significance due to this factor.

#### 5.3.2.3 *Conservation Estate*

Rottnest Island (Wadjemup) is an A Class Reserve. Therefore, all recorded vegetation units which occupy the reserve are considered to be of regional significance due to this factor.

### 5.3.3 Regionally Significant Vegetation

The regional significance of the vegetation units was assessed based on:

- the presence of populations of Priority flora or ecological communities
- the presence of ESAs or areas relevant to a conservation scheme
- the presence of conservation category wetlands
- the presence of high diversity of flora, fauna, communities, or community structure
- the presence of flora species exhibiting range extensions or undescribed species
- having a restricted regional distribution
- being represented by less than 30% of the pre-European extent.

#### 5.3.3.1 *Priority Flora*

No State-listed Priority flora were recorded within the study area and therefore, none of the recorded vegetation units are of significance due to this factor.

#### 5.3.3.2 *Priority Ecological Communities*

No DBCA listed PECs are considered to occur within the study area. Therefore, none of the defined units are considered significant to be of regional significance due to this factor.

#### 5.3.3.3 *ESAs or Conservation Areas*

Rottnest Island is an A Class Reserve, which is therefore an ESA. Therefore, all recorded vegetation units which occupy the reserve are considered to be of regional significance due to this factor.

#### 5.3.3.4 *Conservation Category Wetlands*

No conservation category wetlands occur within the study area. Therefore, none of the defined vegetation units are considered to be of regional significance due to this factor.

#### 5.3.3.5 *High Diversity*

The mean species richness across all quadrats within vegetation units with an affinity for FCT 30a (MlAp and CpMl) was 5.6 species. This compares to the mean species richness recorded by Gibson *et al.* (1994) for FCT SCP 30a, of 21.1 species. The recorded species richness values are considered low in comparison to the respective Gibson *et al.* (1994) sites for FCT SCP 30a.

Of the total 26 species recorded, 19.23% are weeds. The diversity of native taxa recorded within quadrats is not considered high; however, surveying outside of the optimal spring season is likely to have resulted in fewer species (e.g. annuals) being present. None of the recorded vegetation units are considered to exhibit high diversity and are therefore not considered to be of regional significance due to this factor.

#### 5.3.3.6 *Range Extending/Undescribed Flora*

No undescribed or range extending flora species were recorded within the study area. Therefore, none of the defined units are considered significant to be of regional significance due to this factor.

#### 5.3.3.7 *Restricted Regional Representation and Distribution*

Beard (1990) vegetation association 125 is represented by 9,017.32 ha across the Swan Coastal Plain and 1,948.17 ha across the Perth IBRA sub-region, which is considered to be restricted in its representation. However, no areas of vegetation association 125 intersect the study area, and therefore, the none of the recorded vegetation units, are considered to be of regional significance due to this factor.

#### 5.3.3.8 *Extent Remaining*

The Beard (1990) vegetation associations 125 and 15 represented within the study area fall below the unconstrained (30%) threshold, with association 125 also falling below the constrained (10%) threshold for retention in comparison to their pre-European extent. Therefore, vegetation units MlAp and CpMl, representative of the 'Low forest cypress pine', association 15 and vegetation units LpAp, TiSS and GtS, representative of the 'Bare areas; salt lakes', association 125 are considered to be of regional significance due to this factor.

### 5.3.4 Locally Significant Vegetation

The local significance of the vegetation units was assessed based on:

- representing small, isolated communities
- their local extent (proportion) and distribution.

#### 5.3.4.1 *Small, Isolated Communities*

Vegetation units GtS, LpAp and SlG occur as small, isolated communities within the study area and are considered locally significant due to this factor.

#### 5.3.4.2 *Locally Limited Extent and Distribution*

The vegetation units CpMl (*Callitris/ Melaleuca* Shrubland) and GtS (*Gahnia* Sedgeland) occupy a small portion (≤1%) of the study area, with extents of 1.0% and 0.73%, respectively. These areas are considered limited in their local extent and distribution and are considered locally significant due to this factor.

### 5.3.5 Summary of Vegetation Significance

The significance of the vegetation units within the study area, along with the aspects determining their significance, are summarised in **Table 12**. The level of significance for each vegetation unit is broadly summarised in **Table 13**.

**Table 12 –Summary of the Significance of the Recorded Vegetation Units**

| Scale | Significance Aspect | Vegetation Units |
|---|---|---|
| National Significance | Populations of Threatened (EPBC listed) species | - |
| | Presence of EPBC listed TECs | - |
| | Presence of Ramsar wetlands | - |
| State Significance | Presence of State-listed Threatened flora | - |
| | Presence of State-listed TECs | MlAp, CpMl |
| | Land within the Conservation Estate | MlAp, ArAp, CpMl, MlGl, OaAp, TiSS, GtS, LpAp, SlG |
| Regional Significance | Presence of Priority flora | - |
| | Presence of PECs | - |
| | Presence of ESAs or areas relevant to a conservation scheme | MlAp, ArAp, CpMl, MlGl, OaAp, TiSS, GtS, LpAp, SlG |
| | Presence of conservation category wetlands | - |
| | High diversity of flora, fauna, communities, or community structure | - |
| | Presence of flora species exhibiting a range extension | - |
| | Presence of undescribed flora | - |
| | Having a restricted regional representation and distribution | - |
| | Represented by less than 30% of the pre-European extent | MlAp, CpMl, TiSS, LpAp, SlG |
| Local Significance | Small, isolated communities | GtS, LpAp, SlG |
| | Having a limited local extent and/or distribution | CpMl, GtS |

**Table 13 – Summary of Level of Potential Significance**

| Vegetation Unit | Overall Significance – Factor of Significance | Area (ha) | % of Survey Area |
|---|---|---|---|
| **MIAp** *Melaleuca/ Acanthocarpus* Woodland | State significance – presence of State-listed TEC<br>State significance – land within the Conservation Estate<br>Regional significance – within an ESA<br>Regional significance – Represented by <30% of pre-European extent | 34.153 | 56.63 |
| **ArAp** *Acacia/Acanthocarpus* Shrubland | State significance – land within the Conservation Estate<br>Regional significance – within an ESA | 4.050 | 6.72 |
| **CpMI** *Callitris/Melaleuca* Shrubland | State significance – presence of State-listed TEC<br>State significance – land within the Conservation Estate<br>Regional significance – within an ESA<br>Regional significance – Represented by <30% of pre-European extent<br>Local significance – limited local extent and/or distribution | 0.605 | 1.00 |
| **MIGI** *Melaleuca/ Guichenotia* Shrubland | State significance – land within the Conservation Estate<br>Regional significance – within an ESA | 9.722 | 16.12 |
| **OaAp** *Olearia/ Acanthocarpus* Shrubland | State significance – land within the Conservation Estate<br>Regional significance – within an ESA | 2.312 | 3.83 |
| **TiSS** *Tecticornia* Samphire Shrubland | State significance – land within the Conservation Estate<br>Regional significance – within an ESA<br>Regional significance – Represented by <30% of pre-European extent | 2.745 | 4.55 |
| **GtS** *Gahnia* Sedgeland | State significance – land within the Conservation Estate<br>Regional significance – within an ESA<br>Local significance – occurring as a small, isolated community<br>Local significance – limited local extent and/or distribution | 0.439 | 0.73 |
| **LpAp** *Lepidosperma/ Acanthocarpus* Sedgeland | State significance – land within the Conservation Estate<br>Regional significance – within an ESA<br>Regional significance – Represented by <30% of pre-European extent<br>Local significance – occurring as a small, isolated community | 2.091 | 3.47 |
| **SIG** Spinifex Grassland | State significance – land within the Conservation Estate<br>Regional significance – within an ESA<br>Regional significance – Represented by <30% of pre-European extent<br>Local significance – occurring as a small, isolated community | 0.811 | 1.34 |
| **Planted** | | 0.334 | 0.55 |
| **Beach** | | 0.540 | 0.90 |
| **Cleared** | | 2.507 | 4.16 |
| | **TOTAL** | **60.309** | **100** |

# 6 CONCLUSIONS

The key findings and conclusions arising from the flora and vegetation assessment within the study area:

- No Threatened flora listed under the BC Act or the EPBC Act were recorded.
- No Priority species as listed by DBCA were recorded.
- No weeds listed as WoNS or DP plants under the BAM Act were recorded.
- The condition of the vegetation was found to range from 'Excellent' to 'Completely Degraded - Degraded' with the greatest proportion in 'Good' condition.
- Nine vegetation units and three other classifications (Beach, Planted and Cleared areas) were defined and mapped within the study area.
- Two of the recorded vegetation units were determined to be characteristic of the State-listed *Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands TEC (FCT 30a).
- The remaining extent of the one vegetation association supported by the study area falls below the 10% retention target in the context of the Swan Coastal Plain, and two vegetation associations relevant to the study area represented by less than 30% of pre-European extent across the Swan Coastal Plain and Perth IBRA sub-region.
- Vegetation units MlAp and CpMl are considered to be representative of the State-listed *Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands TEC (FCT 30a), and therefore, these units are considered to be of State significance.
- Rottnest Island is an A Class Reserve and an ESA, therefore all vegetation it supports is considered to be of State and regional significance.
- Vegetation units MlAp, CpMl, TiSS, LpAl and SlG are representative of pre-European vegetation associations and/or complexes that have less than 30% of their original extent remaining and are therefore considered regionally significant.
- Vegetation units GtS, LpAp and SlG occur as small, isolated communities, and are therefore considered locally significant.
- Vegetation units CpMl and GtS are limited in their local extent and/or distribution, and are therefore, considered locally significant.
- Since *Lepidium puberulum* (P4) has previously been recorded within the study area, and since this species would only be observable during late winter and spring, where clearing impacts may be proposed within areas of suitable habitat (sandy soils associated with limestone), further targeted surveys would be appropriate.

# 7 LIST OF PARTICIPANTS

The personnel who contributed to the project are summarised in **Table 12**.

**Table 14 – Project Team**

| Name | Qualification | Years of Relevant Experience | Role |
|---|---|---|---|
| Kellie Bauer–Simpson<br>Principal Ecologist | BSc. (Biological Science) | 23 | Project manager, field assessment, flora identification, technical and authorisation review |
| Lisa Chappell<br>Senior Botanist/Environmental Scientist | BEnvSc. (Hons) (Environmental Science) | 19 | Field assessment, data management, floristic analysis, GIS mapping, report preparation |
| Olga Nazarova<br>Botanist/Taxonomist | B.Sc. (Botany and Genetics) | 4 | Field survey, Flora identifications support, technical support, reporting |
| Megan Gray<br>Ecologist | B.Sc. (Environmental Biology) | 3 | Report preparation |
| Kelly Hopkinson<br>Graduate Ecologist | BSc. (Biological Science and Conservation Biology) | 1 | Report preparation |
| Will Bauer–Simpson<br>Technician | Cert IV (Health and Safety) | 10 | Field safety and logistics planning, GIS mapping, spatial analysis, spatial data management |
| Megan Rabadan<br>Administration | | 5 | Data entry, editorial support |

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# APPENDIX A - DBCA NATURE MAP SEARCH REPORT

| Life Form | Taxon | WA Cons Code |
|---|---|---|
| DICOT | *Acacia aptaneura* | |
| DICOT | *Acacia cyclops* | |
| DICOT | *Acacia lasiocarpa* var. *lasiocarpa* cockleshell gully variant (e.a.griffin 2039) | |
| DICOT | *Acacia littorea* | |
| DICOT | *Acacia rostellifera* | |
| DICOT | *Acacia truncata* | |
| DICOT | *Acrotriche cordata* | |
| DICOT | *Agonis flexuosa* var. *flexuosa* | |
| DICOT | *Alyxia buxifolia* | |
| DICOT | *Angianthus cunninghamii* | |
| DICOT | *Angianthus preissianus* | |
| DICOT | *Apium annuum* | |
| DICOT | *Arctotheca calendula* | |
| DICOT | *Arctotheca populifolia* | |
| DICOT | *Arenaria leptoclados* | |
| DICOT | *Argyranthemum frutescens* | |
| DICOT | *Atriplex cinerea* | |
| DICOT | *Atriplex isatidea* | |
| DICOT | *Atriplex rhagodioides* | |
| DICOT | *Atriplex sp.* | |
| DICOT | *Beyeria viscosa* | |
| DICOT | *Boronia alata* | |
| DICOT | *Caesalpinia gilliesii* | |
| DICOT | *Cakile maritima* | |
| DICOT | *Cakile maritima* Scop. subsp. *maritima* | |
| DICOT | *Calandrinia brevipedata* | |
| DICOT | *Calandrinia tholiformis* | |
| DICOT | *Callitriche stagnalis* | |
| DICOT | *Canarium mutabile* | |
| DICOT | *Cardamine hirsuta* | |
| DICOT | *Carduus pycnocephalus* | |
| DICOT | *Carpobrotus virescens* | |
| DICOT | *Cassytha glabella* | |
| DICOT | *Casuarina equisetifolia* | |
| DICOT | *Casuarina glauca* | |
| DICOT | *Casuarina obesa* | |
| DICOT | *Centaurea melitensis* | |
| DICOT | *Centaurium erythraea* | |
| DICOT | *Centaurium pulchellum* | |
| DICOT | *Centaurium tenuiflorum* | |
| DICOT | *Cerastium balearicum* | |
| DICOT | *Cerastium glomeratum* | |
| DICOT | *Chenopodium murale* | |
| DICOT | *Cirsium vulgare* | |
| DICOT | *Clematis linearifolia* | |
| DICOT | *Clematis microphylla* | |
| DICOT | *Comesperma confertum* | |

| Life Form | Taxon | WA Cons Code |
|---|---|---|
| DICOT | *Comesperma integerrimum* | |
| DICOT | *Conyza bonariensis* | |
| DICOT | *Conyza parva* | |
| DICOT | *Conyza sumatrensis* | |
| DICOT | *Cotula australis* | |
| DICOT | *Cotula bipinnata* | |
| DICOT | *Cotula coronopifolia* | |
| DICOT | *Crassula colorata* | |
| DICOT | *Crassula colorata* var. *colorata* | |
| DICOT | *Crassula decumbens* | |
| DICOT | *Crassula decumbens* var. *decumbens* | |
| DICOT | *Crassula glomerata* | |
| DICOT | *Crassula natans* var. *minus* | |
| DICOT | *Crassula thunbergiana* subsp. *thunbergiana* | |
| DICOT | *Cymbalaria muralis* | |
| DICOT | *Daucus glochidiatus* | |
| DICOT | *Dichondra repens* | |
| DICOT | *Diplolaena dampieri* | |
| DICOT | *Diplotaxis muralis* | |
| DICOT | *Dischisma arenarium* | |
| DICOT | *Dittrichia graveolens* | |
| DICOT | *Dodonaea aptera* | |
| DICOT | *Drosera ramellosa* | |
| DICOT | *Drosera stolonifera* subsp. *stolonifera* | |
| DICOT | *Enchylaena tomentosa* var. *tomentosa* | |
| DICOT | *Eremophila glabra* | |
| DICOT | *Eremophila glabra* subsp. *albicans* | |
| DICOT | *Erodium cicutarium* | |
| DICOT | *Erythrostemon gilliesii* | |
| DICOT | *Eucalyptus camaldulensis* | |
| DICOT | *Eucalyptus camaldulensis* subsp. *obtusa* | |
| DICOT | *Eucalyptus decipiens* | |
| DICOT | *Eucalyptus erythrocorys* | |
| DICOT | *Eucalyptus gomphocephala* | |
| DICOT | *Eucalyptus spathulata* | |
| DICOT | *Eucalyptus utilis* | |
| DICOT | *Euphorbia paralias* | |
| DICOT | *Euphorbia peplus* | |
| DICOT | *Ficus carica* | |
| DICOT | *Ficus elastica* | |
| DICOT | *Ficus macrophylla* | |
| DICOT | *Ficus microcarpa* subsp. *hillii* | |
| DICOT | *Ficus rubiginosa* | |
| DICOT | *Frankenia pauciflora* | |
| DICOT | *Galium murale* | |
| DICOT | *Gamochaeta calviceps* | |
| DICOT | *Geranium molle* | |
| DICOT | *Gnaphalium indutum* | |
| DICOT | *Gnaphalium indutum* subsp. *indutum* | |

| Life Form | Taxon | WA Cons Code |
|---|---|---|
| DICOT | *Gomphocarpus fruticosus* | |
| DICOT | *Gonocarpus pithyoides* | |
| DICOT | *Guichenotia ledifolia* | |
| DICOT | *Halosarcia halocnemoides* subsp. *halocnemoides* | |
| DICOT | *Halosarcia indica* subsp. *bidens* | |
| DICOT | *Hardenbergia comptoniana* | |
| DICOT | *Hedypnois rhagadioloides* | |
| DICOT | *Hedypnois rhagadioloides* subsp. *cretica* | |
| DICOT | *Heliophila pusilla* | |
| DICOT | *Heliotropium curassavicum* | |
| DICOT | *Hemichroa pentandra* | |
| DICOT | *Hibbertia racemosa* | |
| DICOT | *Hornungia procumbens* | |
| DICOT | *Hydrocotyle blepharocarpa* | |
| DICOT | *Hydrocotyle diantha* | |
| DICOT | *Hydrocotyle hispidula* | |
| DICOT | *Hydrocotyle* sp. Hamelinensis (G.J. Keighery s.n. PERTH 02391325) | |
| DICOT | *Hydrocotyle tetragonocarpa* | |
| DICOT | *Hypochaeris glabra* | |
| DICOT | *Lagunaria patersonia* | |
| DICOT | *Leontodon rhagadioloides* | |
| DICOT | *Lepidium didymum* | |
| DICOT | *Lepidium foliosum* | |
| DICOT | *Lepidium puberulum* | P4 |
| DICOT | *Leptorhynchos scaber* | |
| DICOT | *Leucophyta brownii* | |
| DICOT | *Leucopogon insularis* | |
| DICOT | *Leucopogon parviflorus* | |
| DICOT | *Lobelia anceps* | |
| DICOT | *Lycium ferocissimum* | |
| DICOT | *Lycopersicon esculentum* | |
| DICOT | *Lysiana casuarinae* | |
| DICOT | *Lysimachia arvensis* | |
| DICOT | *Malva arborea* | |
| DICOT | *Malva parviflora* | |
| DICOT | *Malva preissiana* | |
| DICOT | *Medicago polymorpha* | |
| DICOT | *Medicago sativa* | |
| DICOT | *Melaleuca armillaris* | |
| DICOT | *Melaleuca huegelii* | |
| DICOT | *Melaleuca lanceolata* | |
| DICOT | *Melaleuca nesophila* | |
| DICOT | *Melia azedarach* | |
| DICOT | *Melianthus major* | |
| DICOT | *Melilotus indicus* | |
| DICOT | *Mesembryanthemum crystallinum* | |
| DICOT | *Millotia myosotidifolia* | |
| DICOT | *Minuartia mediterranea* | |
| DICOT | *Myoporum caprarioides* | |

| Life Form | Taxon | WA Cons Code |
|---|---|---|
| DICOT | *Myoporum insulare* | |
| DICOT | *Myosotis australis* | P4 |
| DICOT | *Nerium oleander* | |
| DICOT | *Nicotiana glauca* | |
| DICOT | *Nitraria billardierei* | |
| DICOT | *Olea europaea* | |
| DICOT | *Olearia axillaris* | |
| DICOT | *Orobanche minor* | |
| DICOT | *Oxalis corniculata* | |
| DICOT | *Oxalis exilis* | |
| DICOT | *Oxalis pes-caprae* | |
| DICOT | *Parentucellia latifolia* | |
| DICOT | *Parietaria cardiostegia* | |
| DICOT | *Parietaria debilis* | |
| DICOT | *Pelargonium capitatum* | |
| DICOT | *Pelargonium littorale* | |
| DICOT | *Phyllangium divergens* | |
| DICOT | *Phyllanthus calycinus* | |
| DICOT | *Pithocarpa cordata* | |
| DICOT | *Pittosporum ligustrifolium* | |
| DICOT | *Plantago debilis* | |
| DICOT | *Plantago exilis* | |
| DICOT | *Plantago lanceolata* | |
| DICOT | *Podotheca angustifolia* | |
| DICOT | *Polycarpon tetraphyllum* | |
| DICOT | *Poranthera drummondii* | |
| DICOT | *Portulaca oleracea* | |
| DICOT | *Ranunculus pumilio* | |
| DICOT | *Ranunculus pumilio* var. *politus* | |
| DICOT | *Raphanus raphanistrum* | |
| DICOT | *Reseda alba* | |
| DICOT | *Reseda luteola* | |
| DICOT | *Rhagodia baccata* | |
| DICOT | *Rhagodia baccata* subsp. *baccata* | |
| DICOT | *Rhagodia baccata* subsp. *dioica* | |
| DICOT | *Rhamnus alaternus* | |
| DICOT | *Rhodanthe citrina* | |
| DICOT | *Ricinus communis* | |
| DICOT | *Roepera billardierei* | |
| DICOT | *Roepera similis* | |
| DICOT | *Sagina apetala* | |
| DICOT | *Sagina maritima* | |
| DICOT | *Salicornia blackiana* | |
| DICOT | *Salicornia quinqueflora* | |
| DICOT | *Salicornia* sp. | |
| DICOT | *Salsola australis* | |
| DICOT | *Samolus repens* | |
| DICOT | *Samolus repens* (J.R.Forst. & G.Forst.) Pers. var. *repens* | |
| DICOT | *Sarcocornia quinqueflora* | |

| Life Form | Taxon | WA Cons Code |
|---|---|---|
| DICOT | *Sarcocornia quinqueflora* (Bunge ex Ung.-Sternb.) A.J.Scott subsp. *quinqueflora* | |
| DICOT | *Scaevola crassifolia* | |
| DICOT | *Schenkia australis* | |
| DICOT | *Schinus terebinthifolius* | |
| DICOT | *Scholtzia involucrata* | |
| DICOT | *Senecio lautus* subsp. *maritimus* | |
| DICOT | *Senecio pinnatifolius* var. *latilobus* | |
| DICOT | *Senecio pinnatifolius* var. *maritimus* | |
| DICOT | *Silene nocturna* | |
| DICOT | *Sisymbrium orientale* | |
| DICOT | *Solanum lycopersicum* | |
| DICOT | *Solanum nigrum* | |
| DICOT | *Solanum symonii* | |
| DICOT | *Sonchus asper* | |
| DICOT | *Sonchus oleraceus* | |
| DICOT | *Spergularia brevifolia* | |
| DICOT | *Spyridium globulosum* | |
| DICOT | *Stackhousia pubescens* | |
| DICOT | *Stellaria media* | |
| DICOT | *Stellaria pallida* | |
| DICOT | *Stylidium androsaceum* | |
| DICOT | *Suaeda australis* | |
| DICOT | *Tamarix aphylla* | |
| DICOT | *Tamarix* sp. | |
| DICOT | *Tecoma stans* | |
| DICOT | *Tecticornia halocnemoides* | |
| DICOT | *Tecticornia indica* subsp. *bidens* | |
| DICOT | *Templetonia retusa* | |
| DICOT | *Tetragonia amplexicoma* | |
| DICOT | *Tetragonia decumbens* | |
| DICOT | *Tetragonia implexicoma* | |
| DICOT | *Thomasia cognata* | |
| DICOT | *Threlkeldia diffusa* | |
| DICOT | *Trachymene coerulea* | |
| DICOT | *Trachymene coerulea* subsp. *coerulea* | |
| DICOT | *Trachymene pilosa* | |
| DICOT | *Trifolium suffocatum* | |
| DICOT | *Trifolium tomentosum* | |
| DICOT | *Trifolium tomentosum* var. *tomentosum* | |
| DICOT | *Urtica urens* | |
| DICOT | *Verbascum* sp. *scsp* | |
| DICOT | *Waitzia nitida* | |
| DICOT | *Westringia dampieri* | |
| DICOT | *Wilsonia backhousei* | |
| DICOT | *Wilsonia humilis* | |
| DICOT | *Zygophyllum ammophilum* | |
| DICOT | *Zygophyllum fruticulosum* | |
| GYMNO | *Callitris preissii* | |
| GYMNO | *Pinus halepensis* | |

| Life Form | Taxon | WA Cons Code |
|---|---|---|
| GYMNO | *Pinus radiata* | |
| LIVERWORT | *Petalophyllum preissii* | |
| MONOCOT | *Acanthocarpus preissii* | |
| MONOCOT | *Agave americana* | |
| MONOCOT | *Agave attenuata* | |
| MONOCOT | *Agave sisalana* | |
| MONOCOT | *Aira cupaniana* | |
| MONOCOT | *Allium ampeloprasum* | |
| MONOCOT | *Althenia preissii* | |
| MONOCOT | *Amaryllis dianae* | |
| MONOCOT | *Amaryllis quokka* | |
| MONOCOT | *Amphibolis antarctica* | |
| MONOCOT | *Amphibolis griffithii* | |
| MONOCOT | *Asphodelus fistulosus* | |
| MONOCOT | *Austrostipa elegantissima* | |
| MONOCOT | *Austrostipa flavescens* | |
| MONOCOT | *Austrostipa* sp. | |
| MONOCOT | *Avellinia michelii* | |
| MONOCOT | *Avena barbata* | |
| MONOCOT | *Baumea juncea* | |
| MONOCOT | *Brachypodium distachyon* | |
| MONOCOT | *Briza minor* | |
| MONOCOT | *Bromus arenarius* | |
| MONOCOT | *Bromus diandrus* | |
| MONOCOT | *Bromus hordeaceus* | |
| MONOCOT | *Bromus madritensis* | |
| MONOCOT | *Bromus rubens* | |
| MONOCOT | *Bulbine semibarbata* | |
| MONOCOT | *Caladenia latifolia* | |
| MONOCOT | *Carex preissii* | |
| MONOCOT | *Carex thecata* | |
| MONOCOT | *Catapodium rigidum* | |
| MONOCOT | *Cenchrus clandestinus* | |
| MONOCOT | *Centrolepis polygyna* | |
| MONOCOT | *Conostylis candicans* | |
| MONOCOT | *Conostylis candicans* subsp. *calcicola* | |
| MONOCOT | *Conostylis candicans* subsp. *candicans* | |
| MONOCOT | *Cortaderia selloana* | |
| MONOCOT | *Cynodon dactylon* | |
| MONOCOT | *Cyrtostylis huegelii* | |
| MONOCOT | *Desmocladus flexuosus* | |
| MONOCOT | *Ehrharta brevifolia* | |
| MONOCOT | *Ehrharta brevifolia* var. *cuspidata* | |
| MONOCOT | *Ehrharta longiflora* | |
| MONOCOT | *Eragrostis curvula* | |
| MONOCOT | *Ferraria crispa* | |
| MONOCOT | *Ferraria crispa* subsp. *crispa* | |
| MONOCOT | *Ficinia nodosa* | |
| MONOCOT | *Gahnia trifida* | |

| Life Form | Taxon | WA Cons Code |
|---|---|---|
| MONOCOT | *Halophila australis* | |
| MONOCOT | *Halophila ovalis* | |
| MONOCOT | *Heterozostera tasmanica* | |
| MONOCOT | *Hordeum leporinum* | |
| MONOCOT | *Hordeum* sp. | |
| MONOCOT | *Hydrilla verticillata* | |
| MONOCOT | *Hypoxis glabella* var. *glabella* | |
| MONOCOT | *Iris germanica* | |
| MONOCOT | *Isolepis cernua* | |
| MONOCOT | *Isolepis cernua* var. *setiformis* | |
| MONOCOT | *Isolepis marginata* | |
| MONOCOT | *Johnsonia pubescens* | |
| MONOCOT | *Johnsonia pubescens* subsp. *pubescens* | |
| MONOCOT | *Juncus bufonius* | |
| MONOCOT | *Juncus kraussii* subsp. *australiensis* | |
| MONOCOT | *Lachnagrostis nesomytica* | |
| MONOCOT | *Lachnagrostis nesomytica* subsp. *nesomytica* | P1 |
| MONOCOT | *Lachnagrostis nesomytica* subsp. *pseudofiliformis* | P1 |
| MONOCOT | *Lachnagrostis* sp. | |
| MONOCOT | *Lagurus ovatus* | |
| MONOCOT | *Lepidosperma calcicola* | |
| MONOCOT | *Lepidosperma gladiatum* | |
| MONOCOT | *Lepidosperma pubisquameum* | |
| MONOCOT | *Lepidosperma squamatum* | |
| MONOCOT | *Leucojum aestivum* | |
| MONOCOT | *Lolium rigidum* | |
| MONOCOT | *Microlaena stipoides* | |
| MONOCOT | *Moraea flaccida* | |
| MONOCOT | *Moraea miniata* | |
| MONOCOT | *Narcissus papyraceus* | |
| MONOCOT | *Narcissus tazetta* | |
| MONOCOT | *Narcissus tazetta* subsp. *italicus* | |
| MONOCOT | *Ornithogalum arabicum* | |
| MONOCOT | *Parapholis incurva* | |
| MONOCOT | *Pauridia glabella* | |
| MONOCOT | *Phoenix canariensis* | |
| MONOCOT | *Phoenix dactylifera* | |
| MONOCOT | *Phormium tenax* | |
| MONOCOT | *Poa annua* | |
| MONOCOT | *Poa poiformis* | |
| MONOCOT | *Polypogon maritimus* | |
| MONOCOT | *Polypogon maritimus* var. *subspatheaceus* | |
| MONOCOT | *Polypogon monspeliensis* | |
| MONOCOT | *Polypogon tenellus* | |
| MONOCOT | *Posidonia australis* | |
| MONOCOT | *Posidonia coriacea* | |
| MONOCOT | *Posidonia sinuosa* | |
| MONOCOT | *Prasophyllum giganteum* | |
| MONOCOT | *Romulea rosea* var. *australis* | |

| Life Form | Taxon | WA Cons Code |
|---|---|---|
| MONOCOT | *Rostraria cristata* | |
| MONOCOT | *Ruppia polycarpa* | |
| MONOCOT | *Ruppia tuberosa* | |
| MONOCOT | *Rytidosperma occidentale* | |
| MONOCOT | *Schoenus humilis* | |
| MONOCOT | *Schoenus nitens* | |
| MONOCOT | *Sorghum bicolor* | |
| MONOCOT | *Spinifex hirsutus* | |
| MONOCOT | *Spinifex longifolius* | |
| MONOCOT | *Sporobolus indicus* var. *capensis* | |
| MONOCOT | *Sporobolus virginicus* | |
| MONOCOT | *Stenotaphrum secundatum* | |
| MONOCOT | *Syringodium isoetifolium* | |
| MONOCOT | *Thalassodendron pachyrhizum* | |
| MONOCOT | *Thysanotus patersonii* | |
| MONOCOT | *Trachyandra divaricata* | |
| MONOCOT | *Triglochin minutissima* | |
| MONOCOT | *Triglochin mucronata* | |
| MONOCOT | *Triglochin muelleri* subsp. *recurvum* | |
| MONOCOT | *Triglochin striata* | |
| MONOCOT | *Triglochin trichophora* | |
| MONOCOT | *Typha orientalis* | |
| MONOCOT | *Vulpia fasciculata* | |
| MONOCOT | *Vulpia muralis* | |
| MONOCOT | *Vulpia myuros* | |
| MONOCOT | *Vulpia myuros* forma *megalura* | |
| MONOCOT | *Washingtonia filifera* | |
| MONOCOT | *Washingtonia robusta* | |
| MONOCOT | *Wurmbea dioica* subsp. *alba* | |
| MONOCOT | *Wurmbea monantha* | |
| MONOCOT | *Zantedeschia aethiopica* | |
| MOSS | *Bryum pachytheca* | |
| MOSS | *Pseudocrossidium hornschuchianum* | |
| MOSS | *Racopilum cuspidigerum* var. *convolutaceum* | |
| MOSS | *Syntrichia pagorum* | |
| MOSS | *Thuidiopsis sparsa* | |
| MOSS | *Weissia controversa* | |

# APPENDIX B - EPBC PROTECTED MATTERS SEARCH REPORT

Australian Government
Department of Agriculture, Water and the Environment

# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 08-Jun-2022

# Summary

## Matters of National Environment Significance

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

| | |
|---|---|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance (Ramsar | None |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | None |
| Listed Threatened Ecological Communities: | 1 |
| Listed Threatened Species: | 39 |
| Listed Migratory Species: | 65 |

## Other Matters Protected by the EPBC Act

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

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

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

| | |
|---|---|
| Commonwealth Lands: | None |
| Commonwealth Heritage Places: | None |
| Listed Marine Species: | 93 |
| Whales and Other Cetaceans: | 12 |
| Critical Habitats: | None |
| Commonwealth Reserves Terrestrial: | None |
| Australian Marine Parks: | None |
| Habitat Critical to the Survival of Marine Turtles: | None |

## Extra Information

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

| | |
|---|---|
| State and Territory Reserves: | 1 |
| Regional Forest Agreements: | None |
| Nationally Important Wetlands: | 1 |
| EPBC Act Referrals: | 3 |
| Key Ecological Features (Marine): | None |
| Biologically Important Areas: | 13 |
| Bioregional Assessments: | None |
| Geological and Bioregional Assessments: | None |

# Details

## Matters of National Environmental Significance

### Listed Threatened Ecological Communities [ Resource Information ]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

| Community Name | Threatened Category | Presence Text |
|---|---|---|
| Banksia Woodlands of the Swan Coastal Plain ecological community | Endangered | Community may occur within area |

### Listed Threatened Species [ Resource Information ]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| BIRD | | |
| Anous tenuirostris melanops<br>Australian Lesser Noddy [26000] | Vulnerable | Species or species habitat may occur within area |
| Calidris canutus<br>Red Knot, Knot [855] | Endangered | Species or species habitat known to occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area |
| Calidris tenuirostris<br>Great Knot [862] | Critically Endangered | Roosting known to occur within area |
| Charadrius leschenaultii<br>Greater Sand Plover, Large Sand Plover [877] | Vulnerable | Species or species habitat known to occur within area |
| Charadrius mongolus<br>Lesser Sand Plover, Mongolian Plover [879] | Endangered | Roosting known to occur within area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Diomedea amsterdamensis<br>Amsterdam Albatross [64405] | Endangered | Species or species habitat may occur within area |
| Diomedea epomophora<br>Southern Royal Albatross [89221] | Vulnerable | Species or species habitat may occur within area |
| Diomedea exulans<br>Wandering Albatross [89223] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Diomedea sanfordi<br>Northern Royal Albatross [64456] | Endangered | Species or species habitat may occur within area |
| Limosa lapponica menzbieri<br>Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432] | Critically Endangered | Species or species habitat known to occur within area |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area |
| Macronectes halli<br>Northern Giant Petrel [1061] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat likely to occur within area |
| Pachyptila turtur subantarctica<br>Fairy Prion (southern) [64445] | Vulnerable | Species or species habitat likely to occur within area |
| Rostratula australis<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat may occur within area |
| Sternula nereis nereis<br>Australian Fairy Tern [82950] | Vulnerable | Foraging, feeding or related behaviour known to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Thalassarche carteri | | |
| Indian Yellow-nosed Albatross [64464] | Vulnerable | Species or species habitat likely to occur within area |
| Thalassarche cauta | | |
| Shy Albatross [89224] | Endangered | Foraging, feeding or related behaviour likely to occur within area |
| Thalassarche impavida | | |
| Campbell Albatross, Campbell Black-browed Albatross [64459] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche melanophris | | |
| Black-browed Albatross [66472] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Thalassarche steadi | | |
| White-capped Albatross [64462] | Vulnerable | Species or species habitat may occur within area |
| Zanda latirostris listed as Calyptorhynchus latirostris | | |
| Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737] | Endangered | Species or species habitat may occur within area |
| FISH | | |
| Thunnus maccoyii | | |
| Southern Bluefin Tuna [69402] | Conservation Dependent | Species or species habitat likely to occur within area |
| INSECT | | |
| Hesperocolletes douglasi | | |
| Douglas' Broad-headed Bee, Rottnest Bee [66734] | Critically Endangered | Species or species habitat may occur within area |
| MAMMAL | | |
| Balaenoptera musculus | | |
| Blue Whale [36] | Endangered | Species or species habitat likely to occur within area |
| Eubalaena australis | | |
| Southern Right Whale [40] | Endangered | Breeding known to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| [Neophoca cinerea](#)<br>Australian Sea-lion, Australian Sea Lion [22] | Endangered | Species or species habitat likely to occur within area |
| [Setonix brachyurus](#)<br>Quokka [229] | Vulnerable | Species or species habitat known to occur within area |
| **PLANT** | | |
| [Diuris micrantha](#)<br>Dwarf Bee-orchid [55082] | Vulnerable | Species or species habitat may occur within area |
| **REPTILE** | | |
| [Caretta caretta](#)<br>Loggerhead Turtle [1763] | Endangered | Foraging, feeding or related behaviour known to occur within area |
| [Chelonia mydas](#)<br>Green Turtle [1765] | Vulnerable | Foraging, feeding or related behaviour known to occur within area |
| [Dermochelys coriacea](#)<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Species or species habitat known to occur within area |
| [Natator depressus](#)<br>Flatback Turtle [59257] | Vulnerable | Foraging, feeding or related behaviour known to occur within area |
| **SHARK** | | |
| [Carcharias taurus (west coast population)](#)<br>Grey Nurse Shark (west coast population) [68752] | Vulnerable | Species or species habitat known to occur within area |
| [Carcharodon carcharias](#)<br>White Shark, Great White Shark [64470] | Vulnerable | Species or species habitat known to occur within area |
| [Pristis pristis](#)<br>Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756] | Vulnerable | Species or species habitat may occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Rhincodon typus<br>Whale Shark [66680] | Vulnerable | Species or species habitat may occur within area |
| Sphyrna lewini<br>Scalloped Hammerhead [85267] | Conservation Dependent | Species or species habitat likely to occur within area |

| Listed Migratory Species | | [ Resource Information ] |
|---|---|---|
| Scientific Name | Threatened Category | Presence Text |
| Migratory Marine Birds | | |
| Anous stolidus<br>Common Noddy [825] | | Species or species habitat likely to occur within area |
| Ardenna carneipes<br>Flesh-footed Shearwater, Fleshy-footed Shearwater [82404] | | Species or species habitat likely to occur within area |
| Ardenna pacifica<br>Wedge-tailed Shearwater [84292] | | Breeding known to occur within area |
| Diomedea amsterdamensis<br>Amsterdam Albatross [64405] | Endangered | Species or species habitat may occur within area |
| Diomedea epomophora<br>Southern Royal Albatross [89221] | Vulnerable | Species or species habitat may occur within area |
| Diomedea exulans<br>Wandering Albatross [89223] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Diomedea sanfordi<br>Northern Royal Albatross [64456] | Endangered | Species or species habitat may occur within area |
| Hydroprogne caspia<br>Caspian Tern [808] | | Breeding known to occur within area |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Macronectes halli<br>Northern Giant Petrel [1061] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Onychoprion anaethetus<br>Bridled Tern [82845] | | Breeding known to occur within area |
| Phaethon rubricauda<br>Red-tailed Tropicbird [994] | | Breeding known to occur within area |
| Sterna dougallii<br>Roseate Tern [817] | | Breeding known to occur within area |
| Thalassarche carteri<br>Indian Yellow-nosed Albatross [64464] | Vulnerable | Species or species habitat likely to occur within area |
| Thalassarche cauta<br>Shy Albatross [89224] | Endangered | Foraging, feeding or related behaviour likely to occur within area |
| Thalassarche impavida<br>Campbell Albatross, Campbell Black-browed Albatross [64459] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche melanophris<br>Black-browed Albatross [66472] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Thalassarche steadi<br>White-capped Albatross [64462] | Vulnerable | Species or species habitat may occur within area |
| Migratory Marine Species | | |
| Balaenoptera edeni<br>Bryde's Whale [35] | | Species or species habitat may occur within area |
| Balaenoptera musculus<br>Blue Whale [36] | Endangered | Species or species habitat likely to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Caperea marginata<br>Pygmy Right Whale [39] | | Species or species habitat may occur within area |
| Carcharhinus longimanus<br>Oceanic Whitetip Shark [84108] | | Species or species habitat may occur within area |
| Carcharodon carcharias<br>White Shark, Great White Shark [64470] | Vulnerable | Species or species habitat known to occur within area |
| Caretta caretta<br>Loggerhead Turtle [1763] | Endangered | Foraging, feeding or related behaviour known to occur within area |
| Chelonia mydas<br>Green Turtle [1765] | Vulnerable | Foraging, feeding or related behaviour known to occur within area |
| Dermochelys coriacea<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Species or species habitat known to occur within area |
| Eubalaena australis as Balaena glacialis australis<br>Southern Right Whale [40] | Endangered | Breeding known to occur within area |
| Lamna nasus<br>Porbeagle, Mackerel Shark [83288] | | Species or species habitat may occur within area |
| Megaptera novaeangliae<br>Humpback Whale [38] | | Species or species habitat known to occur within area |
| Mobula alfredi as Manta alfredi<br>Reef Manta Ray, Coastal Manta Ray [90033] | | Species or species habitat known to occur within area |
| Mobula birostris as Manta birostris<br>Giant Manta Ray [90034] | | Species or species habitat may occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| [Natator depressus](#) | | |
| Flatback Turtle [59257] | Vulnerable | Foraging, feeding or related behaviour known to occur within area |
| [Orcinus orca](#) | | |
| Killer Whale, Orca [46] | | Species or species habitat may occur within area |
| [Pristis pristis](#) | | |
| Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756] | Vulnerable | Species or species habitat may occur within area |
| [Rhincodon typus](#) | | |
| Whale Shark [66680] | Vulnerable | Species or species habitat may occur within area |
| **Migratory Terrestrial Species** | | |
| [Motacilla cinerea](#) | | |
| Grey Wagtail [642] | | Species or species habitat may occur within area |
| **Migratory Wetlands Species** | | |
| [Actitis hypoleucos](#) | | |
| Common Sandpiper [59309] | | Species or species habitat known to occur within area |
| [Arenaria interpres](#) | | |
| Ruddy Turnstone [872] | | Roosting known to occur within area |
| [Calidris acuminata](#) | | |
| Sharp-tailed Sandpiper [874] | | Roosting known to occur within area |
| [Calidris alba](#) | | |
| Sanderling [875] | | Roosting known to occur within area |
| [Calidris canutus](#) | | |
| Red Knot, Knot [855] | Endangered | Species or species habitat known to occur within area |
| [Calidris ferruginea](#) | | |
| Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat known to occur within area |
| Calidris ruficollis<br>Red-necked Stint [860] | | Roosting known to occur within area |
| Calidris tenuirostris<br>Great Knot [862] | Critically Endangered | Roosting known to occur within area |
| Charadrius bicinctus<br>Double-banded Plover [895] | | Roosting known to occur within area |
| Charadrius leschenaultii<br>Greater Sand Plover, Large Sand Plover [877] | Vulnerable | Species or species habitat known to occur within area |
| Charadrius mongolus<br>Lesser Sand Plover, Mongolian Plover [879] | Endangered | Roosting known to occur within area |
| Gallinago megala<br>Swinhoe's Snipe [864] | | Roosting likely to occur within area |
| Gallinago stenura<br>Pin-tailed Snipe [841] | | Roosting likely to occur within area |
| Limosa lapponica<br>Bar-tailed Godwit [844] | | Species or species habitat known to occur within area |
| Limosa limosa<br>Black-tailed Godwit [845] | | Roosting known to occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat likely to occur within area |
| Numenius minutus<br>Little Curlew, Little Whimbrel [848] | | Roosting likely to occur within area |
| Numenius phaeopus<br>Whimbrel [849] | | Roosting known to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Pandion haliaetus<br>Osprey [952] | | Breeding known to occur within area |
| Phalaropus lobatus<br>Red-necked Phalarope [838] | | Roosting known to occur within area |
| Pluvialis fulva<br>Pacific Golden Plover [25545] | | Roosting known to occur within area |
| Pluvialis squatarola<br>Grey Plover [865] | | Roosting known to occur within area |
| Thalasseus bergii<br>Greater Crested Tern [83000] | | Breeding known to occur within area |
| Tringa brevipes<br>Grey-tailed Tattler [851] | | Roosting known to occur within area |
| Tringa nebularia<br>Common Greenshank, Greenshank [832] | | Species or species habitat known to occur within area |
| Tringa stagnatilis<br>Marsh Sandpiper, Little Greenshank [833] | | Roosting known to occur within area |
| Tringa totanus<br>Common Redshank, Redshank [835] | | Roosting known to occur within area |
| Xenus cinereus<br>Terek Sandpiper [59300] | | Roosting known to occur within area |

## Other Matters Protected by the EPBC Act

| Listed Marine Species | | [ Resource Information ] |
|---|---|---|
| Scientific Name | Threatened Category | Presence Text |
| Bird | | |
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat known to occur within area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Anous stolidus<br>Common Noddy [825] | | Species or species habitat likely to occur within area |
| Anous tenuirostris melanops<br>Australian Lesser Noddy [26000] | Vulnerable | Species or species habitat may occur within area |
| Ardenna carneipes as Puffinus carneipes<br>Flesh-footed Shearwater, Fleshy-footed Shearwater [82404] | | Species or species habitat likely to occur within area |
| Ardenna pacifica as Puffinus pacificus<br>Wedge-tailed Shearwater [84292] | | Breeding known to occur within area |
| Arenaria interpres<br>Ruddy Turnstone [872] | | Roosting known to occur within area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Roosting known to occur within area |
| Calidris alba<br>Sanderling [875] | | Roosting known to occur within area |
| Calidris canutus<br>Red Knot, Knot [855] | Endangered | Species or species habitat known to occur within area overfly marine area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area overfly marine area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat known to occur within area overfly marine area |
| Calidris ruficollis<br>Red-necked Stint [860] | | Roosting known to occur within area overfly marine area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Calidris tenuirostris<br>Great Knot [862] | Critically Endangered | Roosting known to occur within area<br>overfly marine area |
| Charadrius bicinctus<br>Double-banded Plover [895] | | Roosting known to occur within area<br>overfly marine area |
| Charadrius leschenaultii<br>Greater Sand Plover, Large Sand Plover [877] | Vulnerable | Species or species habitat known to occur within area |
| Charadrius mongolus<br>Lesser Sand Plover, Mongolian Plover [879] | Endangered | Roosting known to occur within area |
| Charadrius ruficapillus<br>Red-capped Plover [881] | | Roosting known to occur within area<br>overfly marine area |
| Chroicocephalus novaehollandiae as Larus novaehollandiae<br>Silver Gull [82326] | | Breeding known to occur within area |
| Diomedea amsterdamensis<br>Amsterdam Albatross [64405] | Endangered | Species or species habitat may occur within area |
| Diomedea epomophora<br>Southern Royal Albatross [89221] | Vulnerable | Species or species habitat may occur within area |
| Diomedea exulans<br>Wandering Albatross [89223] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Diomedea sanfordi<br>Northern Royal Albatross [64456] | Endangered | Species or species habitat may occur within area |
| Gallinago megala<br>Swinhoe's Snipe [864] | | Roosting likely to occur within area<br>overfly marine area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Gallinago stenura<br>Pin-tailed Snipe [841] | | Roosting likely to occur within area<br>overfly marine area |
| Haliaeetus leucogaster<br>White-bellied Sea-Eagle [943] | | Species or species habitat may occur within area |
| Himantopus himantopus<br>Pied Stilt, Black-winged Stilt [870] | | Roosting known to occur within area<br>overfly marine area |
| Hydroprogne caspia as Sterna caspia<br>Caspian Tern [808] | | Breeding known to occur within area |
| Larus pacificus<br>Pacific Gull [811] | | Foraging, feeding or related behaviour may occur within area |
| Limosa lapponica<br>Bar-tailed Godwit [844] | | Species or species habitat known to occur within area |
| Limosa limosa<br>Black-tailed Godwit [845] | | Roosting known to occur within area<br>overfly marine area |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area |
| Macronectes halli<br>Northern Giant Petrel [1061] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Motacilla cinerea<br>Grey Wagtail [642] | | Species or species habitat may occur within area overfly marine area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat likely to occur within area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Numenius minutus<br>Little Curlew, Little Whimbrel [848] | | Roosting likely to occur within area<br>overfly marine area |
| Numenius phaeopus<br>Whimbrel [849] | | Roosting known to occur within area |
| Onychoprion anaethetus as Sterna anaethetus<br>Bridled Tern [82845] | | Breeding known to occur within area |
| Onychoprion fuscatus as Sterna fuscata<br>Sooty Tern [90682] | | Breeding known to occur within area |
| Pachyptila turtur<br>Fairy Prion [1066] | | Species or species habitat likely to occur within area |
| Pandion haliaetus<br>Osprey [952] | | Breeding known to occur within area |
| Phaethon rubricauda<br>Red-tailed Tropicbird [994] | | Breeding known to occur within area |
| Phalaropus lobatus<br>Red-necked Phalarope [838] | | Roosting known to occur within area |
| Pluvialis fulva<br>Pacific Golden Plover [25545] | | Roosting known to occur within area |
| Pluvialis squatarola<br>Grey Plover [865] | | Roosting known to occur within area<br>overfly marine area |
| Puffinus assimilis<br>Little Shearwater [59363] | | Breeding known to occur within area |
| Recurvirostra novaehollandiae<br>Red-necked Avocet [871] | | Roosting known to occur within area<br>overfly marine area |
| Rostratula australis as Rostratula benghalensis (sensu lato)<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat may occur within area overfly marine area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Sterna dougallii<br>Roseate Tern [817] | | Breeding known to occur within area |
| Sternula nereis as Sterna nereis<br>Fairy Tern [82949] | | Breeding known to occur within area |
| Thalassarche carteri<br>Indian Yellow-nosed Albatross [64464] | Vulnerable | Species or species habitat likely to occur within area |
| Thalassarche cauta<br>Shy Albatross [89224] | Endangered | Foraging, feeding or related behaviour likely to occur within area |
| Thalassarche impavida<br>Campbell Albatross, Campbell Black-browed Albatross [64459] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche melanophris<br>Black-browed Albatross [66472] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Thalassarche steadi<br>White-capped Albatross [64462] | Vulnerable | Species or species habitat may occur within area |
| Thalasseus bergii as Sterna bergii<br>Greater Crested Tern [83000] | | Breeding known to occur within area |
| Thinornis cucullatus as Thinornis rubricollis<br>Hooded Plover, Hooded Dotterel [87735] | | Species or species habitat known to occur within area<br>overfly marine area |
| Tringa brevipes as Heteroscelus brevipes<br>Grey-tailed Tattler [851] | | Roosting known to occur within area |
| Tringa nebularia<br>Common Greenshank, Greenshank [832] | | Species or species habitat known to occur within area<br>overfly marine area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| [Tringa stagnatilis](#)<br>Marsh Sandpiper, Little Greenshank [833] | | Roosting known to occur within area<br>overfly marine area |
| [Tringa totanus](#)<br>Common Redshank, Redshank [835] | | Roosting known to occur within area<br>overfly marine area |
| [Xenus cinereus](#)<br>Terek Sandpiper [59300] | | Roosting known to occur within area<br>overfly marine area |
| **Fish** | | |
| [Acentronura australe](#)<br>Southern Pygmy Pipehorse [66185] | | Species or species habitat may occur within area |
| [Campichthys galei](#)<br>Gale's Pipefish [66191] | | Species or species habitat may occur within area |
| [Heraldia nocturna](#)<br>Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227] | | Species or species habitat may occur within area |
| [Hippocampus angustus](#)<br>Western Spiny Seahorse, Narrow-bellied Seahorse [66234] | | Species or species habitat may occur within area |
| [Hippocampus breviceps](#)<br>Short-head Seahorse, Short-snouted Seahorse [66235] | | Species or species habitat may occur within area |
| [Hippocampus subelongatus](#)<br>West Australian Seahorse [66722] | | Species or species habitat may occur within area |
| [Histiogamphelus cristatus](#)<br>Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243] | | Species or species habitat may occur within area |
| [Lissocampus caudalis](#)<br>Australian Smooth Pipefish, Smooth Pipefish [66249] | | Species or species habitat may occur within area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Lissocampus fatiloquus<br>Prophet's Pipefish [66250] | | Species or species habitat may occur within area |
| Lissocampus runa<br>Javelin Pipefish [66251] | | Species or species habitat may occur within area |
| Maroubra perserrata<br>Sawtooth Pipefish [66252] | | Species or species habitat may occur within area |
| Mitotichthys meraculus<br>Western Crested Pipefish [66259] | | Species or species habitat may occur within area |
| Nannocampus subosseus<br>Bonyhead Pipefish, Bony-headed Pipefish [66264] | | Species or species habitat may occur within area |
| Phycodurus eques<br>Leafy Seadragon [66267] | | Species or species habitat may occur within area |
| Phyllopteryx taeniolatus<br>Common Seadragon, Weedy Seadragon [66268] | | Species or species habitat may occur within area |
| Pugnaso curtirostris<br>Pugnose Pipefish, Pug-nosed Pipefish [66269] | | Species or species habitat may occur within area |
| Solegnathus lettiensis<br>Gunther's Pipehorse, Indonesian Pipefish [66273] | | Species or species habitat may occur within area |
| Stigmatopora argus<br>Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276] | | Species or species habitat may occur within area |
| Stigmatopora nigra<br>Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277] | | Species or species habitat may occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Urocampus carinirostris<br>Hairy Pipefish [66282] | | Species or species habitat may occur within area |
| Vanacampus margaritifer<br>Mother-of-pearl Pipefish [66283] | | Species or species habitat may occur within area |
| Vanacampus phillipi<br>Port Phillip Pipefish [66284] | | Species or species habitat may occur within area |
| Vanacampus poecilolaemus<br>Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285] | | Species or species habitat may occur within area |
| **Mammal** | | |
| Arctocephalus forsteri<br>Long-nosed Fur-seal, New Zealand Fur-seal [20] | | Species or species habitat may occur within area |
| Neophoca cinerea<br>Australian Sea-lion, Australian Sea Lion [22] | Endangered | Species or species habitat likely to occur within area |
| **Reptile** | | |
| Aipysurus pooleorum<br>Shark Bay Seasnake [66061] | | Species or species habitat may occur within area |
| Caretta caretta<br>Loggerhead Turtle [1763] | Endangered | Foraging, feeding or related behaviour known to occur within area |
| Chelonia mydas<br>Green Turtle [1765] | Vulnerable | Foraging, feeding or related behaviour known to occur within area |
| Dermochelys coriacea<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Species or species habitat known to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Disteira kingii<br>Spectacled Seasnake [1123] | | Species or species habitat may occur within area |
| Natator depressus<br>Flatback Turtle [59257] | Vulnerable | Foraging, feeding or related behaviour known to occur within area |
| Pelamis platurus<br>Yellow-bellied Seasnake [1091] | | Species or species habitat may occur within area |

| Whales and Other Cetaceans | | [ Resource Information ] |
|---|---|---|
| Current Scientific Name | Status | Type of Presence |
| Mammal | | |
| Balaenoptera acutorostrata<br>Minke Whale [33] | | Species or species habitat may occur within area |
| Balaenoptera edeni<br>Bryde's Whale [35] | | Species or species habitat may occur within area |
| Balaenoptera musculus<br>Blue Whale [36] | Endangered | Species or species habitat likely to occur within area |
| Caperea marginata<br>Pygmy Right Whale [39] | | Species or species habitat may occur within area |
| Delphinus delphis<br>Common Dolphin, Short-beaked Common Dolphin [60] | | Species or species habitat may occur within area |
| Eubalaena australis<br>Southern Right Whale [40] | Endangered | Breeding known to occur within area |
| Grampus griseus<br>Risso's Dolphin, Grampus [64] | | Species or species habitat may occur within area |

| Current Scientific Name | Status | Type of Presence |
|---|---|---|
| Megaptera novaeangliae<br>Humpback Whale [38] | | Species or species habitat known to occur within area |
| Orcinus orca<br>Killer Whale, Orca [46] | | Species or species habitat may occur within area |
| Stenella attenuata<br>Spotted Dolphin, Pantropical Spotted Dolphin [51] | | Species or species habitat may occur within area |
| Tursiops aduncus<br>Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418] | | Species or species habitat likely to occur within area |
| Tursiops truncatus s. str.<br>Bottlenose Dolphin [68417] | | Species or species habitat may occur within area |

## Extra Information

| State and Territory Reserves | | [ Resource Information ] |
|---|---|---|
| Protected Area Name | Reserve Type | State |
| Rottnest Island | State Reserve | WA |

| Nationally Important Wetlands | [ Resource Information ] |
|---|---|
| Wetland Name | State |
| Rottnest Island Lakes | WA |

| EPBC Act Referrals | | | [ Resource Information ] |
|---|---|---|---|
| Title of referral | Reference | Referral Outcome | Assessment Status |
| Not controlled action | | | |
| INDIGO Central Submarine Telecommunications Cable | 2017/8127 | Not Controlled Action | Completed |
| Rottnest Lodge Redevelopment | 2019/8565 | Not Controlled Action | Completed |
| Seismic Survey, Bremer Basin, Mentelle Basin and Zeewyck Sub-basin | 2004/1700 | Not Controlled Action | Completed |

| Biologically Important Areas | | |
|---|---|---|
| Scientific Name | Behaviour | Presence |

| Scientific Name | Behaviour | Presence |
|---|---|---|
| **Seabirds** | | |
| Ardenna carneipes<br>Flesh-footed Shearwater [82404] | Aggregation | Known to occur |
| Ardenna pacifica<br>Wedge-tailed Shearwater [84292] | Foraging (in high numbers) | Known to occur |
| Eudyptula minor<br>Little Penguin [1085] | Foraging (provisioning young) | Known to occur |
| Hydroprogne caspia<br>Caspian Tern [808] | Foraging (provisioning young) | Known to occur |
| Larus pacificus<br>Pacific Gull [811] | Foraging (in high numbers) | Former Range |
| Onychoprion anaethetus<br>Bridled Tern [82845] | Foraging (in high numbers) | Known to occur |
| Puffinus assimilis tunneyi<br>Little Shearwater [59363] | Foraging (in high numbers) | Known to occur |
| Sterna dougallii<br>Roseate Tern [817] | Foraging | Known to occur |
| Sternula nereis<br>Fairy Tern [82949] | Foraging (in high numbers) | Known to occur |
| **Seals** | | |
| Neophoca cinerea<br>Australian Sea Lion [22] | Foraging (male) | Likely to occur |
| **Whales** | | |
| Balaenoptera musculus brevicauda<br>Pygmy Blue Whale [81317] | Distribution | Known to occur |
| Eubalaena australis<br>Southern Right Whale [40] | Calving buffer | Known to occur |

| Scientific Name | Behaviour | Presence |
| --- | --- | --- |
| Megaptera novaeangliae | | |
| Humpback Whale [38] | Migration (north and south) | Known to occur |

# Caveat

## 1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

## 2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

## 3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

## 4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

# Acknowledgements

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

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

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

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



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# APPENDIX C – FLORA SPECIES BY VEGETATION UNIT

*denotes introduced (weed) species

| Family | Taxon | MIAp | | | | CpMI | ArAp | MIGl | GtS | OaAp | LpAp | TiSS | SIG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Q03 | Q06 | Q08 | Q11 | Q12 | R01 | R02 | R04 | R05 | R07 | R09 | R10 |
| Asparagaceae | *Acanthocarpus preissii* | + | + | + | + | | + | + | | + | + | | + |
| Araliaceae | *Trachymene coerulea* | | | | | | + | | | | | | |
| Asphodelaceae | **Asphodelus fistulosus* | | | | | | | | | + | | + | + |
| Asphodelaceae | **Trachyandra divaricata* | + | + | | + | + | + | + | | | + | | + |
| Asteraceae | **Dittrichia graveolens* | | | | | | | + | | + | | + | + |
| Asteraceae | *Olearia axillaris* | | | | | | | | | + | + | | |
| Casuarinaceae | *Allocasuarina huegeliana* | | | | + | | | | | | | | |
| Chenopodiaceae | *Rhagodia baccata* | | | | | | | + | | | + | | |
| Chenopodiaceae | *Tecticornia indica* subsp. *bidens* | | | | | | | | | | | + | |
| Cupressaceae | *Callitris preissii* | | + | | | + | | + | | | | | |
| Cyperaceae | *Gahnia trifida* | | | + | | | | | + | | | + | |
| Cyperaceae | *Lepidosperma gladiatum* | | | | | | | | | | + | | |
| Cyperaceae | *Lepidosperma pubisquameum* | | | | | | | | | + | | | |
| Fabaceae | *Acacia rostellifera* | | | | + | + | + | + | | | + | | |
| Goodeniaceae | *Scaevola crassifolia* | | | | | | + | | | | | | + |
| Haemodoraceae | *Conostylis candicans* | | | | | | | | | | + | | |
| Malvaceae | *Guichenotia ledifolia* | | + | | | | + | + | | | | | |
| Myrtaceae | *Agonis flexuosa* | | | | | + | | | | | | | |
| Myrtaceae | *Eucalyptus platypus* | | | | | + | | | | | | | |
| Myrtaceae | *Melaleuca lanceolata* | + | + | + | + | + | | + | | | | | |
| Poaceae | *Austrostipa flavescens* | | | | | | | + | | | | | |
| Poaceae | **Pentameris airoides* | | | + | | | | | | | | | |
| Poaceae | *Poa poiformis* | + | + | + | | | | + | | + | + | + | |
| Poaceae | *Spinifex longifolius* | | | | | | | | | | | | + |
| Poaceae | *Sporobolus virginicus* | | | | | | | | | | | + | |
| Zygophyllaceae | *Roepera* sp. | | | + | | | | | | | | | |

# APPENDIX D – QUADRAT AND RELEVÉ SITE DATA

## Site Q03

| | |
|---|---|
| **Date** | 2 May 2022 |
| **Botanist** | [redacted] |
| **Quadrat Size** | 10 x 10 m |
| **NW Corner Coordinates** | 362326mE 6457483mN |
| **Vegetation Unit** | Melaleuca/ Acanthocarpus Woodland |
| **Slope** | Flat |
| **Landform** | Valley |
| **Soil Colour** | Brown |
| **Soil Type** | Sand |
| **Litter** | 70% |
| **Bare Ground** | 5% |
| **Fire Age** | >10 Years |
| **Vegetation Condition** | Good to Very Good |
| **Disturbances/Impacts** | Loss of structure, no mid or understorey |

| Species | Height (m) | % Cover |
|---|---|---|
| *Melaleuca lanceolata* | 10 | 70 |
| *Poa poiformis* | 0.2 | 1 |
| *Acanthocarpus preissii* | 0.15 | <1 |
| *Trachyandra divaricata* | 0.1 | <1 |
| *Cotyledon* sp. | 0.01 | 1 |

## Site Q06

| | |
|---|---|
| **Date** | 2 May 2022 |
| **Botanist** | [redacted] |
| **Quadrat Size** | 10 x 10 m |
| **NW Corner Coordinates** | 362619mE 6457770mN |
| **Vegetation Unit** | Melaleuca/ Acanthocarpus Woodland |
| **Slope** | Steep |
| **Landform** | Hilltop |
| **Soil Colour** | Pale brown |
| **Soil Type** | Sand |
| **Litter** | 25% |
| **Bare Ground** | 15% |
| **Fire Age** | >10 Years |
| **Vegetation Condition** | Very Good |
| **Disturbances/Impacts** | Some weeds, some loss of mid-storey |

| Species | Height (m) | % Cover |
|---|---|---|
| *Melaleuca lanceolata* | 9 | 20 |
| *Acanthocarpus preissii* | 1 | 15 |
| *Poa poiformis* | 0.7 | 4 |
| *Guichenotia ledifolia* | 0.6 | 7 |
| *Trachyandra divaricata* | | + |
| *Callitris preissii* | | Associated |

## Site Q08

| | |
|---|---|
| **Date** | 2 May 2022 |
| **Botanist** | [redacted] |
| **Quadrat Size** | 10 x 10 m |
| **NW Corner Coordinates** | 362948mE 6457893mN |
| **Vegetation Unit** | Melaleuca/ Acanthocarpus Woodland |
| **Slope** | Flat |
| **Landform** | Swamp edge |
| **Soil Colour** | Brown |
| **Soil Type** | Sandy clay |
| **Litter** | 90% |
| **Bare Ground** | 2% |
| **Fire Age** | >10 Years |
| **Vegetation Condition** | Good to Very Good |
| **Disturbances/Impacts** | Fallen wood, dry conditions |

| Species | Height (m) | % Cover |
|---|---|---|
| *Melaleuca lanceolata* | 11 | 70 |
| *Gahnia trifida* | 0.6 | 1 |
| *Poa poiformis* | 0.3 | 1 |
| *Acanthocarpus preissii* | | + |
| *Pentameris airoides* | | + |
| *Zygophyllum* sp. | | + |

## Site Q11

| | |
|---|---|
| **Date** | 2 May 2022 |
| **Botanist** | [redacted] |
| **Quadrat Size** | 10 x 10 m |
| **NW Corner Coordinates** | 362690mE 6458323mN |
| **Vegetation Unit** | Melaleuca/ Acanthocarpus Woodland |
| **Slope** | Moderate |
| **Landform** | Hillside |
| **Soil Colour** | Pale brown |
| **Soil Type** | Sand |
| **Litter** | 20% |
| **Bare Ground** | 5% |
| **Fire Age** | >10 Years |
| **Vegetation Condition** | Very Good |
| **Disturbances/Impacts** | Fallen wood, weeds |

| Species | Height (m) | % Cover |
|---|---|---|
| *Melaleuca lanceolata* | 8 | 25 |
| *Allocasuarina huegeliana* | 5 | 1 |
| *Acanthocarpus preissii* | 0.8 | 30 |
| *Acacia rostellifera* | | + |
| *Trachyandra divaricata* | | + |

## Site Q12

| | |
|---|---|
| **Date** | 2 May 2022 |
| **Botanist** | [redacted] |
| **Quadrat Size** | 10 x 10 m |
| **NW Corner Coordinates** | 362392mE 6458498mN |
| **Vegetation Unit** | Callitris/ Melaleuca Shrubland |
| **Slope** | Flat |
| **Landform** | Flat |
| **Soil Colour** | Pale brown |
| **Soil Type** | Sand |
| **Litter** | 50% |
| **Bare Ground** | 5% |
| **Fire Age** | 5-10 Years |
| **Vegetation Condition** | Very Good |
| **Disturbances/Impacts** | No structure (rehab?) |

| Species | Height (m) | % Cover |
|---|---|---|
| *Callitris preissii* | 4 | 15 |
| *Agonis flexuosa* | 3 | 5 |
| *Melaleuca lanceolata* | 3 | 5 |
| *Acacia rostellifera* | 3 | 12 |
| *Eucalyptus platypus* | | Associated |
| *Trachyandra divaricata* | | Associated |

## Site R01

| | |
|---|---|
| **Date** | 2 May 2022 |
| **Botanist** | [redacted] |
| **Quadrat Size** | 10 x 10 m |
| **NW Corner Coordinates** | 362253mE 6457299mN |
| **Vegetation Unit** | Acacia/ Acanthocarpus Shrubland |
| **Slope** | Moderate |
| **Landform** | Valley |
| **Soil Colour** | Brown |
| **Soil Type** | Sand |
| **Litter** | 80% |
| **Bare Ground** | 0% |
| **Fire Age** | 5-10 Years |
| **Vegetation Condition** | Excellent |
| **Disturbances/Impacts** | Negligible |

| Species | Height (m) | % Cover |
|---|---|---|
| *Acacia rostellifera* | 5 | 20 |
| *Acanthocarpus preissii* | 1 | 40 |
| *Trachyandra divaricata* | 0.2 | 1 |
| *Guichenotia ledifolia* | | + |
| *Scaevola crassifolia* | | + |
| *Trachymene coerulea* | | + |

## Site R02

| | |
|---|---|
| **Date** | 2 May 2022 |
| **Botanist** | [redacted] |
| **Quadrat Size** | 10 x 10 m |
| **NW Corner Coordinates** | 362262mE 6457381mN |
| **Vegetation Unit** | Melaleuca/ Guichenotia Shrubland |
| **Slope** | Moderate |
| **Landform** | Hillside |
| **Soil Colour** | Pale brown |
| **Soil Type** | Sand |
| **Litter** | 15% |
| **Bare Ground** | 15% |
| **Fire Age** | 5-10 Years |
| **Vegetation Condition** | Good |
| **Disturbances/Impacts** | Weeds, loss of structure |

| Species | Height (m) | % Cover |
|---|---|---|
| *Melaleuca lanceolata* | 2.5 | 2 |
| *Callitris preissii* | 2 | 2 |
| *Guichenotia ledifolia* | 1 | 30 |
| *Acanthocarpus preissii* | 0.8 | 15 |
| *Rhagodia baccata* | 0.6 | 5 |
| *Trachyandra divaricata* | 0.3 | 1 |
| *Acacia rostellifera* | | + |
| *Austrostipa flavescens* | | + |
| *Dittrichia graveolens* | | + |
| *Poa poiformis* | | + |

## Site R04

| | |
|---|---|
| **Date** | 2 May 2022 |
| **Botanist** | [redacted] |
| **Quadrat Size** | 10 x 10 m |
| **NW Corner Coordinates** | 362490mE 6457633mN |
| **Vegetation Unit** | Gahnia Sedgeland |
| **Slope** | Flat |
| **Landform** | Swamp |
| **Soil Colour** | Brown |
| **Soil Type** | Clay |
| **Litter** | 5% |
| **Bare Ground** | 20% |
| **Fire Age** | >10 Years |
| **Vegetation Condition** | Very Good to Excellent |
| **Disturbances/Impacts** | No diversity |

| Species | Height (m) | % Cover |
|---|---|---|
| *Gahnia trifida* | 1.3 | 30 |

## Site R05

| | |
|---|---|
| **Date** | 2 May 2022 |
| **Botanist** | Kellie Bauer-Simpson and Lisa Chappell |
| **Quadrat Size** | 10 x 10 m |
| **NW Corner Coordinates** | 362486mE 6457775mN |
| **Vegetation Unit** | Olearia/ Acanthocarpus Shrubland |
| **Slope** | Moderate |
| **Landform** | Hillside |
| **Soil Colour** | Pale brown |
| **Soil Type** | Sand |
| **Litter** | 15% |
| **Bare Ground** | 25% |
| **Fire Age** | 5-10 Years |
| **Vegetation Condition** | Very Good |
| **Disturbances/Impacts** | Weeds |

| Species | Height (m) | % Cover |
|---|---|---|
| *Olearia axillaris* | 2 | 10 |
| *Acanthocarpus preissii* | 0.6 | 20 |
| *Asphodelus fistulosus* | 0.5 | 5 |
| *Poa poiformis* | 0.4 | 4 |
| *Dittrichia graveolens* | | + |
| *Lepidosperma pubisquameum* | | + |
| *Lepidosperma gladiatum* | 0.7 | 15 |
| *Rhagodia baccata* | 0.5 | 4 |

## Site R07

| | |
|---|---|
| **Date** | 2 May 2022 |
| **Botanist** | [redacted] |
| **Quadrat Size** | 10 x 10 m |
| **NW Corner Coordinates** | 362738mE 6457638mN |
| **Vegetation Unit** | Lepidosperma/ Acanthocarpus Sedgeland |
| **Slope** | Steep |
| **Landform** | Hillside |
| **Soil Colour** | Very pale brown |
| **Soil Type** | Sand |
| **Litter** | 10% |
| **Bare Ground** | 15% |
| **Fire Age** | 5-10 Years |
| **Vegetation Condition** | Good |
| **Disturbances/Impacts** | Some weeds |

| Species | Height (m) | % Cover |
|---|---|---|
| *Acanthocarpus preissii* | 0.5 | 25 |
| *Conostylis candicans* | 0.3 | 8 |
| *Trachyandra divaricata* | 0.1 | 3 |
| *Acacia rostellifera* | | + |
| *Olearia axillaris* | | + |
| *Poa poiformis* | | + |

## Site Q09

| | |
|---|---|
| **Date** | 2 May 2022 |
| **Botanist** | [redacted] |
| **Quadrat Size** | 10 x 10 m |
| **NW Corner Coordinates** | 362987mE 6458043mN |
| **Vegetation Unit** | Tecticornia Samphire Shrubland |
| **Slope** | Flat |
| **Landform** | Swamp |
| **Soil Colour** | Pale brown |
| **Soil Type** | Clay |
| **Litter** | 10% |
| **Bare Ground** | 15% |
| **Fire Age** | >10 Years |
| **Vegetation Condition** | Very Good |
| **Disturbances/Impacts** | Nil |

| Species | Height (m) | % Cover |
|---|---|---|
| *Spinifex longifolius* | 0.8 | 50 |
| *Scaevola crassifolia* | 0.3 | 15 |
| *Acanthocarpus preissii* | | + |
| *Asphodelus fistulosus* | | + |
| *Dittrichia graveolens* | | + |
| *Trachyandra divaricata* | | + |

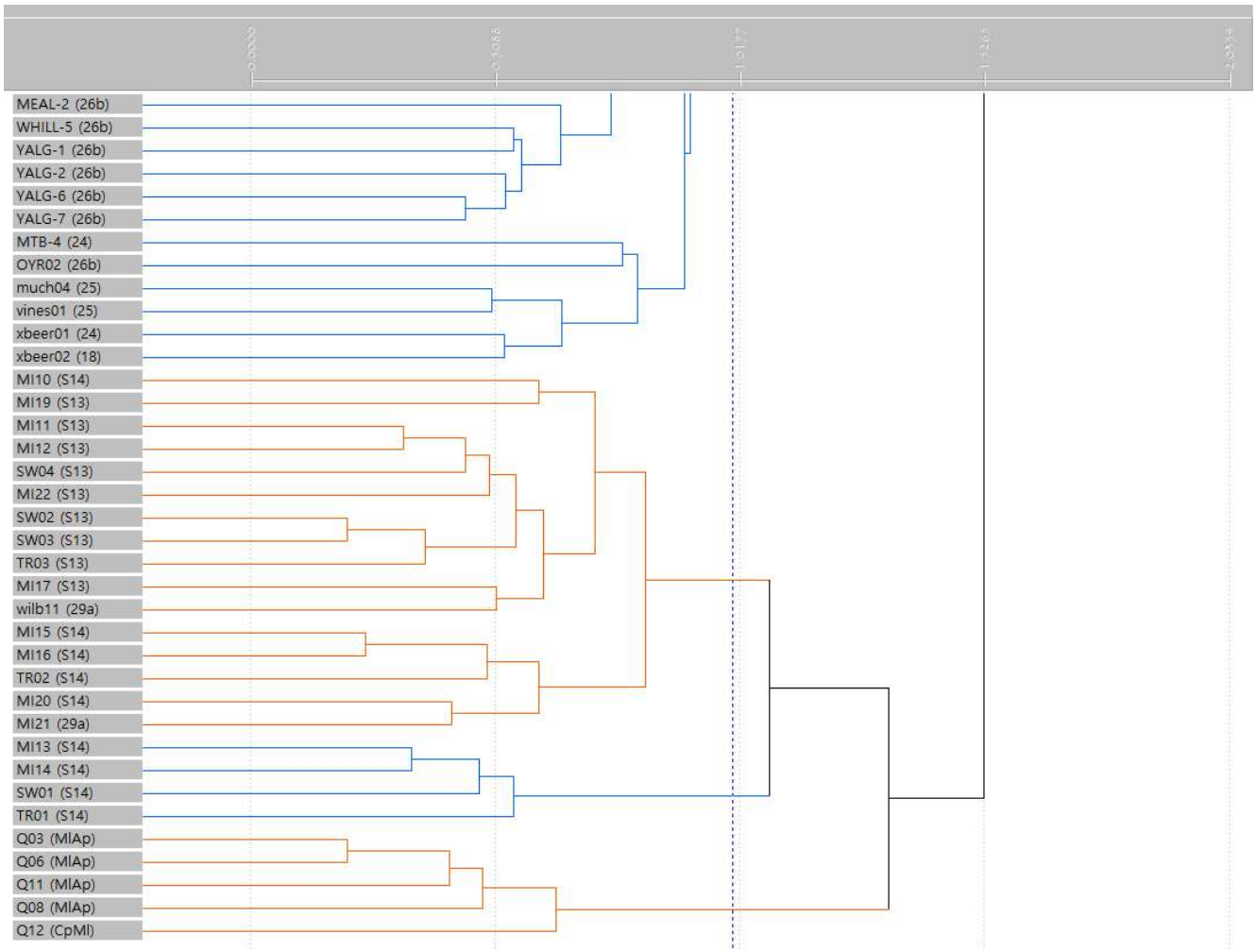
## Site R10

| | |
|---|---|
| **Date** | 2 May 2022 |
| **Botanist** | [redacted] |
| **Quadrat Size** | 10 x 10 m |
| **NW Corner Coordinates** | 363577mE 6458299mN |
| **Vegetation Unit** | Spinifex Grassland |
| **Slope** | Steep |
| **Landform** | Foredune |
| **Soil Colour** | White |
| **Soil Type** | Sand |
| **Litter** | 5% |
| **Bare Ground** | 15% |
| **Fire Age** | >10 Years |
| **Vegetation Condition** | Degraded to Good |

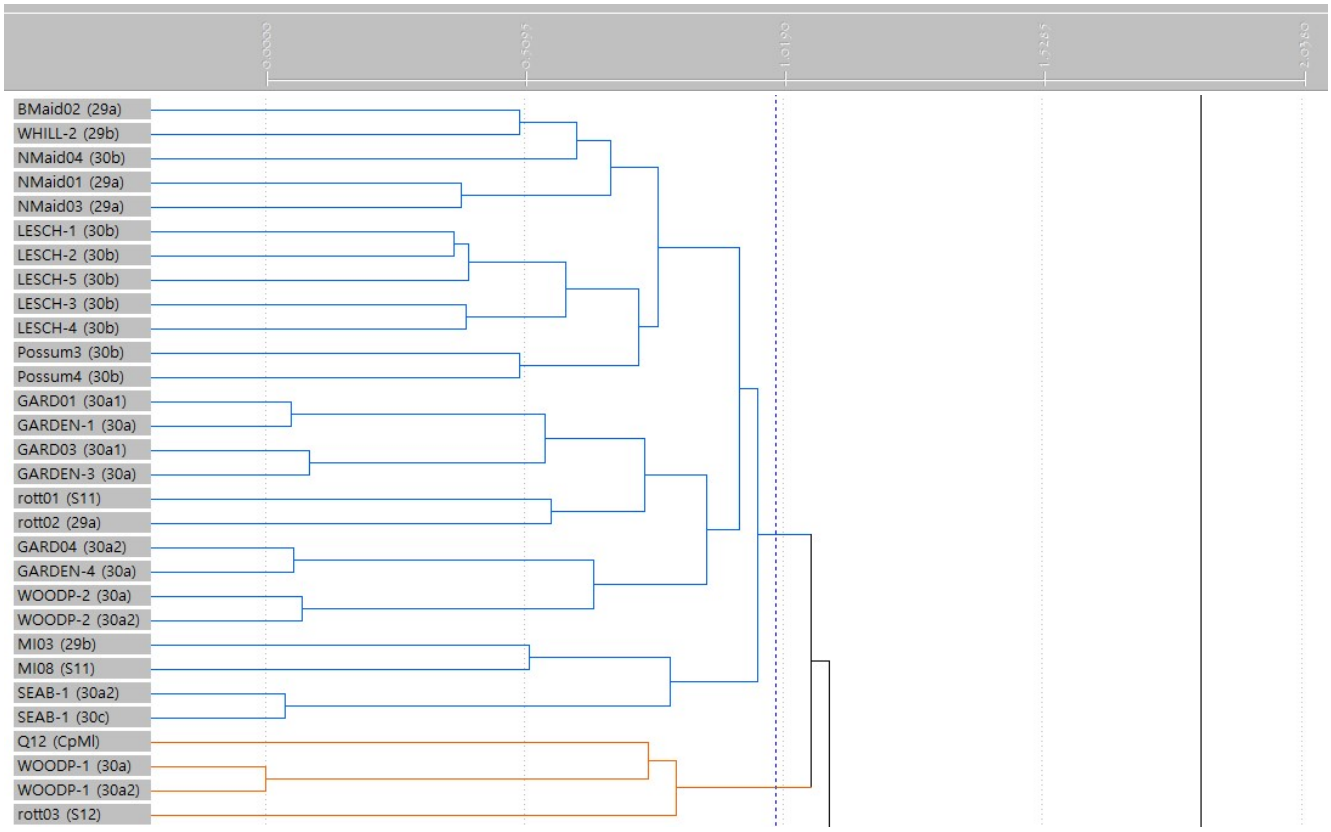
| Species | Height (m) | % Cover |
|---|---|---|
| Spinifex longifolius | 0.8 | 50 |
| Scaevola crassifolia | 0.3 | 15 |
| Acanthocarpus preissii | | + |
| Asphodelus fistulosus | | + |
| Dittrichia graveolens | | + |
| Trachyandra divaricata | | + |

# APPENDIX E – BATCH AND SSI DENDROGRAMS

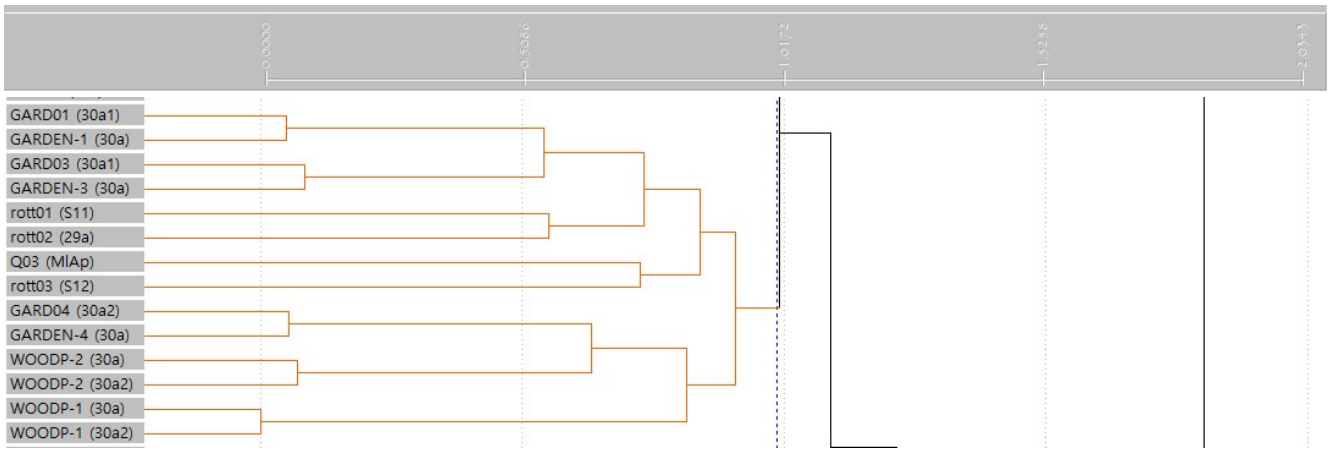
## Dendrogram 1 – Excerpt Batch Analysis RIA Quadrats



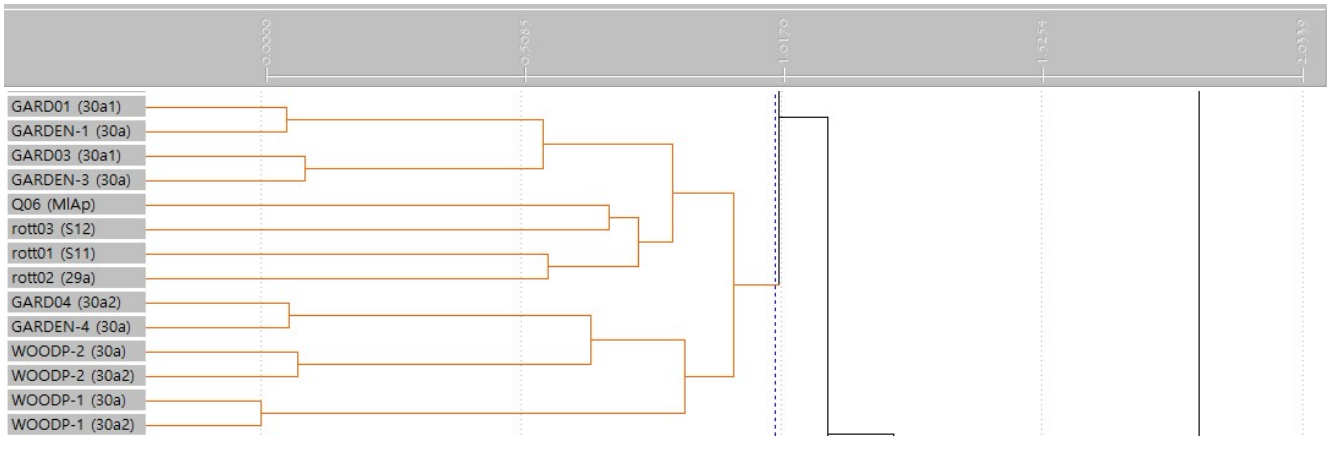
## Dendrogram 2– CpMl SSI Q12



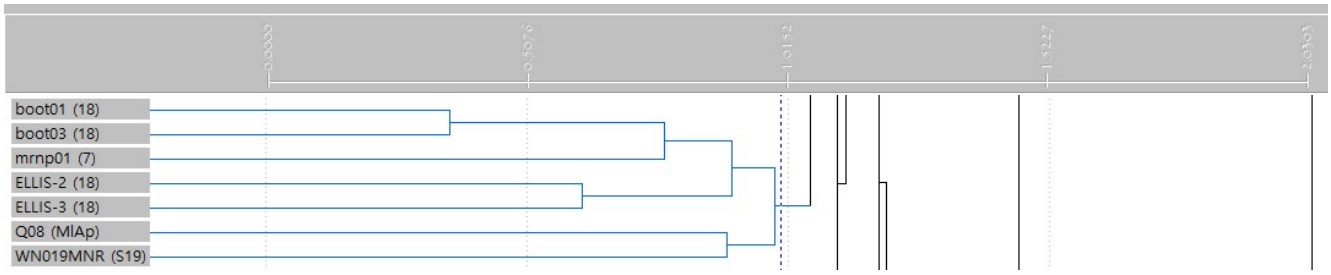

## Dendrogram 3 – MlAp SSI Q03




## Dendrogram 4 – MlAp SSI Q06



## Dendrogram 5 – MlAp SSI Q08




## Dendrogram 6– MlAp SSI Q11