FLORA AND VEGETATION SURVEY

SOUTH THOMSON AND KINGSTOWN, ROTTNEST ISLAND (WADJEMUP)

THE ROTTNEST ISLAND AUTHORITY

JUNE 2023

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TABLE OF CONTENTS

FIGURES

TABLES

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 (TECs) and Priority Ecological Communities (PECs), and Threatened or Priority flora of Rottnest Island (Wadjemup) within the South Thompson and Kingstown areas.

The scope of work included a single-phase, reconnaissance flora and vegetation survey during autumn, which assessed three areas, with associated reporting and data delivery. After this initial survey, it was decided that an addition single-phase, reconnaissance flora and vegetation survey was also required, which assessed an additional three areas during late-winter, with associated reporting and data-delivery.

These two single-phase, reconnaissance flora and vegetation field assessments were carried out in the survey area by experienced botanists on 2 May and 30 August 2022.

The key findings and conclusions arising from the flora and vegetation assessments within the survey 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' with the greatest proportion in 'Good' and 'Degraded' condition.
- Nine vegetation units and four other classifications (Beach, Planted, Open Water and Cleared areas) were defined and mapped within the survey 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 (vegetation association 125) supported by the survey area falls below the 10% retention target in the context of the Swan Coastal Plain, and two vegetation associations relevant to the survey 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 CpMl occurs as a small, isolated community also being limited in its local extent and/or distribution, and is therefore considered locally significant.
- *Lepidium puberulum* (P4) has previously been recorded from one location within the survey area (DBCA 2022a). This species was not recorded to occur within the survey area despite extensive searching in the vicinity of the known recorded location. Further targeted surveys may 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 Priority Ecological Communities (PECs), 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 therefore were required to be conducted as per the *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a).

1.2 LOCATION

The survey area is located within the South Thomson and Kingstown areas of Rottnest Island, an offshore island, approximately 18 kilometres (km) west of Fremantle. Rottnest Island (Wadjemup) is part of the City of Cockburn. The survey area, as shown in **Figure 1**, comprises of six individual areas, herein referred to as the survey area.

1.3 SCOPE OF WORK

The scope of work required to be fulfilled for the survey 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 field assessment survey, incorporating:
    - a reconnaissance assessment in accordance with EPA (2016a) across the full area extent/s of the initial survey area (autumn) and secondary survey area (late-winter) 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 Area

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2 LEGISLATIVE CONTEXT

The flora and vegetation assessments were 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 assessments 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** 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. 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** 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** 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** 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** (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for Vulnerable but are not listed as Conservation Dependent. (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** 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** 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). 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** 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". 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** 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". 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** 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". 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* (CALM 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 survey 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 May 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**). The three months preceding the August field survey (May to July 2022), recorded maximum temperatures similar to that of the long-term average while the months of May and June were wetter than average, receiving 58.1 mm more rainfall than the monthly average (**Figure 2**).

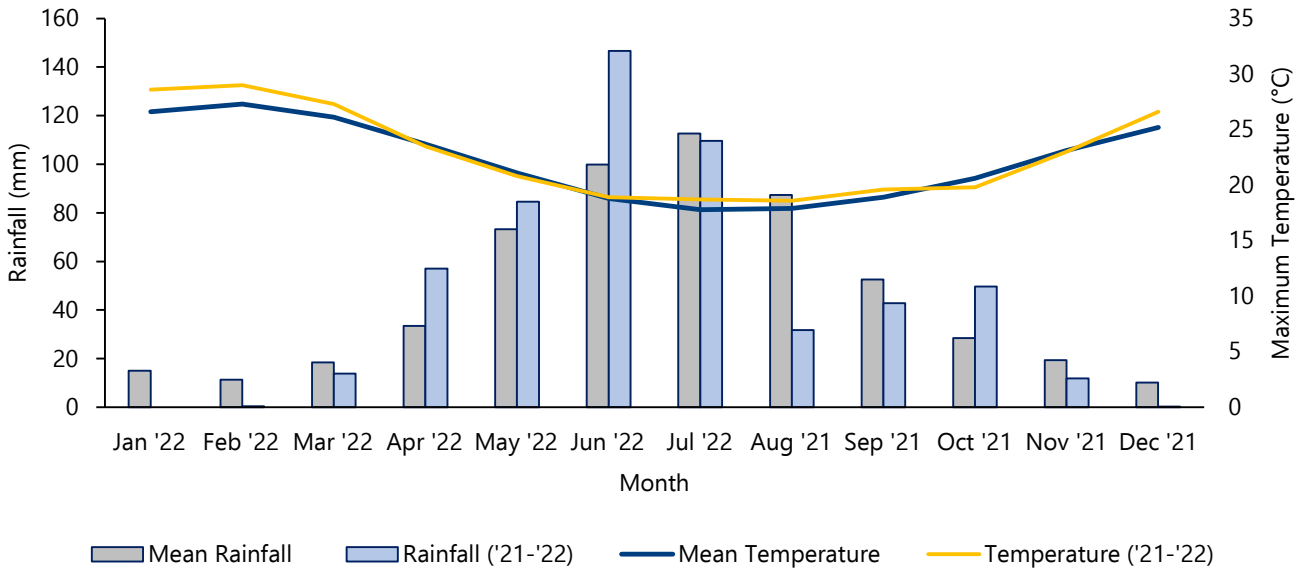

Figure 2 - Climate Data for Rottnest Island Weather Station (009193) (BoM 2022)

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 survey 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 survey 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 Survey 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 survey area is located on the Swan Coastal Plain and has been broadly characterised by Beard (1990). The three Beard vegetation associations (15, 125 and 1007) supported by the survey 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 Survey 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 survey 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 survey 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 Survey 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 indicates 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 survey 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 2022c).

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 survey area was assessed based on known records and their age (currency) and proximity to the survey area, and the presence of suitable habitat within the survey 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 survey area, these species were given a category of 'likely to occur', whilst species occurring a greater distance from the survey 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 survey area on 2 May 2022 by, Kellie Bauer-Simpson (Principal Ecologist) and Lisa Chappell (Senior Botanist) with a secondary reconnaissance field assessment carried out on 30 August 2022 by Kellie Bauer-Simpson (Principal Ecologist), Lisa Chappell (Senior Botanist) and Sarah Beckwith (Undergraduate Ecologist), in accordance with EPA guidelines (2016a).

Within areas that were considered to potentially be representative of TECs or PECs, targeted surveys were carried out via the sampling of quadrats where condition was 'Good' to 'Excellent'. 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 13 relevés were recorded, with their locations 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, TECs and PECs was carried out while traversing the survey areas, and track logs of all personnel were captured using GPS-enabled devices to demonstrate survey effort. These combined track logs for the survey area are presented in **Figure 6**.

The flora and vegetation data collected during the field assessments, from the combination of quadrats, relevés and continuous opportunistic observations, contributed to the flora inventory for the survey area. The vegetation units of the survey area have also 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 and relevé data was then subject to floristic analysis to detect similar vegetation within the survey 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 - Search Traverses

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RIA22001 12 October 2022

4.3 SURVEY LIMITATIONS

The current assessments were 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 survey area. DBCA database search results are evidence of the high volume of records that exist for the survey area and surrounds.
Scope (detail)	No	Out of season reconnaissance flora and vegetation assessments were carried out in accordance with EPA (2016a) during May and August 2022. 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. Five quadrats were sampled within vegetation in 'Good' or better condition and 13 relevés were sampled in areas of 'Degraded' or poorer condition vegetation. This level of survey detail was considered more than adequate for the assessment of floristic values.
Competency/Experience of personnel	No	All of the personnel leading the field assessments, and undertaking flora identifications, data analysis, vegetation mapping and reporting are experienced botanists, with specialist skills in their respective fields. All botanists have a minimum of 18 years' experience with a significant proportion of which have been on the Swan Coastal Plain.
Survey effort/detail/intensity	No	The field flora and vegetation field assessments were not conducted during the optimal spring survey season although the reconnaissance assessments were considered adequate to determine the floristic values within the survey area. Five quadrats were sampled within vegetation in 'Good' or better condition and 13 relevés were sampled in an area of 'Degraded' or poorer condition vegetation. Five quadrats and seven relevés were sampled in 8 May 2022, with six relevés sampled on 30 August 2022.
Seasonal timing and climatic conditions	Yes	The flora and vegetation field assessments were not conducted during the optimal spring season for biological surveys on the Swan Coastal Plain. It is considered that the number of species recorded, particularly annual species, would be higher if the survey was conducted during spring. 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. The months preceding the August field survey, June (particularly) experienced 46.7 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 survey area was mostly easily accessible on foot (except where extremely dense) and was traversed in relatively good detail during May and August 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 survey area. Therefore, mapping reliability is considered high.
Disturbances	No	Numerous tracks bisect the survey 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.
Survey completeness	No	Most areas were easily accessible and data and other information for the region is abundant. The field surveys for the current survey were all able to be completed for the entire survey 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 survey area determined five species of Threatened and Priority flora that have the potential to occur on Rottnest Island (**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 survey area or within 3 km of the survey area (**Figure 7**). One species, *Lepidium puberulum* (P4) has been previously recorded within the survey area and is therefore '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 Survey 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 survey 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 survey 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 survey 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 survey 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 survey area is possibly similar habitat.	DBCA/WAH, NatureMap

0 0.5 1 1.5 km

GDA 94 / MGA Zone 50

Figure 7 - DBCA Threatened and Priority Flora

Legend

- Survey Area
- Lachnagrostis nesomytica subsp. nesomytica
- Lachnagrostis nesomytica subsp. pseudofiliformis
- Lepidium puberulum
- Myosotis australis

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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 survey area (DBCA 2022c, DCCEEW 2022b) (**Table 8**). Of these, five are Microbial (Microbialites and microbial mat) 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**, and discussed further below in Section 5.1.2.1.

Table 8 – Threatened and Priority Ecological Communities Occurring within the Survey 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 – Callitris preissii (or Melaleuca lanceolata) Forests and Woodlands*

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

5.2 FIELD ASSESSMENT

5.2.1 Flora

A total of 32 flora taxa, from 29 genera and 18 families was recorded during the field survey. The dominant families were found to be Poaceae (five taxa), Cyperaceae (four taxa), Chenopodiaceae (three taxa) and Myrtaceae (three taxa). The total includes 27 (84.38%) native species and five (15.63%) introduced (weed) species. The average species richness within quadrats was 5.6 species. Two 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 61.1% of sample sites)
- **Trachyandra divaricata* (recorded in 72.2% 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 in the field assessment. 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.

Lepidium puberulum (P4) has previously been recorded from one location within the survey area (DBCA 2022a). This species was not recorded to occur within the survey area for this assessment, despite extensive searching in the vicinity of the known recorded location. This annual herb species would only be observable during late winter and spring. Therefore, where clearing impacts may be proposed within areas of suitable habitat (sandy soils associated with limestone), further targeted surveys during late winter and spring may 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 Units*

Nine vegetation units and four other classifications (Beach, Planted, Open Water and Cleared areas) were defined and mapped within the survey area as described in **Table 9**. A large portion of the survey area (44%) consists of vegetation unit MlAp (*Melaleuca/Acanthocarpus* Woodland), and vegetation unit MlGl (*Melaleuca/Guichenotia* Shrubland) accounts for 22.79% of the survey area.

The remaining seven vegetation units account a total of 24.81% of the survey area. The three classifications (Beach, Planted and Cleared areas) occupy the remaining 8.4% of the survey area. The spatial extent of the varying vegetation units is presented in **Figure 9**.

Table 9 - Summary of Recorded Vegetation Units in the Survey Area

Broad Type	Vegetation Unit	Vegetation Description	Site Number	Area (ha)	% of Survey Area
Woodland	**MlAp** *Melaleuca/Acanthocarpus* Woodland	*Melaleuca lanceolata* Tall Shrubland over *Acanthocarpus preissii* Low Open Shrubland	Q03, Q06, Q08, Q11, R16	44.39	44.00
Shrubland	**ArAp** *Acacia/Acanthocarpus* Shrubland	*Acacia rostellifera* Tall Open Shrubland over *Acanthocarpus preissii* Low Shrubland over *Trachyandra divaricata* Low Sparse Forbland	R01	5.20	5.15
	CpMl *Callitris/Melaleuca* Shrubland	*Callitris preissii* and *Melaleuca lanceolata* Tall Shrubland	Q12	0.60	0.60
	MlGl *Melaleuca/Guichenotia* Shrubland	*Melaleuca lanceolata* and *Callitris preissii* Tall Sparse Shrubland over *Guichenotia ledifolia, Acanthocarpus preissii* and *Rhagodia baccata* Shrubland over *Trachyandra divaricata* Low Sparse Forbland	R02, R15	23.00	22.79
	OaAp *Olearia/Acanthocarpus* Shrubland	*Olearia axillaris* Tall Sparse Shrubland over *Acanthocarpus preissii* Low Open Shrubland	R05, R17	4.03	4.00
	TiSS *Tecticornia* Samphire Shrubland	*Tecticornia indica* subsp. *bidens* Low Samphire Shrubland	R09, R14	5.70	5.65
Sedgelands	**GtS** *Gahnia* Sedgeland	*Gahnia trifida* and *Ficinia nodosa* Tall Sedgeland	R04, R18	3.88	3.85
	LpAp *Lepidosperma/Acanthocarpus* Sedgeland	*Acanthocarpus preissii, Rhagodia baccata* and *Conostylis candicans* Low Open Shrubland over *Lepidosperma gladiatum* Open Sedgeland over *Trachyandra divaricata* Low Sparse Forbland	R07, R13	3.05	3.02
Grassland	**SlG** Spinifex Grassland	*Scaevola crassifolia* Low Open Shrubland over *Spinifex longifolius* Grassland	R10	2.56	2.54
Planted		Planted non-endemic species	NA	0.33	0.33
Beach			NA	0.83	0.83
Open Water			NA	0.62	0.61
Cleared			NA	6.69	6.63
			TOTAL	**100.88**	**100**

Figure 9 - Vegetation Units

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5.2.2.2 *Vegetation Condition*

The condition of the vegetation within the survey area was found to range from 'Excellent' to 'Completely Degraded' with three other classifications (Beach, Open Water and Cleared) (**Table 10**). The greatest proportion of the vegetation (49.16%) was observed to be in either 'Good' condition (24.58%) or 'Degraded' condition (24.58%). The spatial extent of the varying vegetation condition is presented in **Figure 10**.

Table 10 - Summary Vegetation Condition within the Survey Area

Vegetation Condition Rating	Area (ha)	% of Survey Area
Excellent	1.02	1.01
Very Good - Excellent	0.06	0.06
Very Good	14.16	14.03
Good - Very Good	13.63	13.51
Good	24.79	24.58
Degraded - Good	6.52	6.46
Degraded	24.79	24.58
Completely Degraded - Degraded	5.84	5.79
Completely Degraded	1.92	1.91
Beach	0.84	0.83
Open Water	0.62	0.61
Cleared	6.69	6.63
Total	**100.88**	**100**

Figure 10 - Vegetation Condition

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5.2.2.3 *Assessment of Floristic Community Types*

All vegetation units within the survey area were sampled and defined from a single relevé, unless they were suspected to be representative of the TEC, FCT 30a. Five 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 four of the quadrats, with the fifth (Q12) determined to be floristically dissimilar, as shown in **Figure 11**.

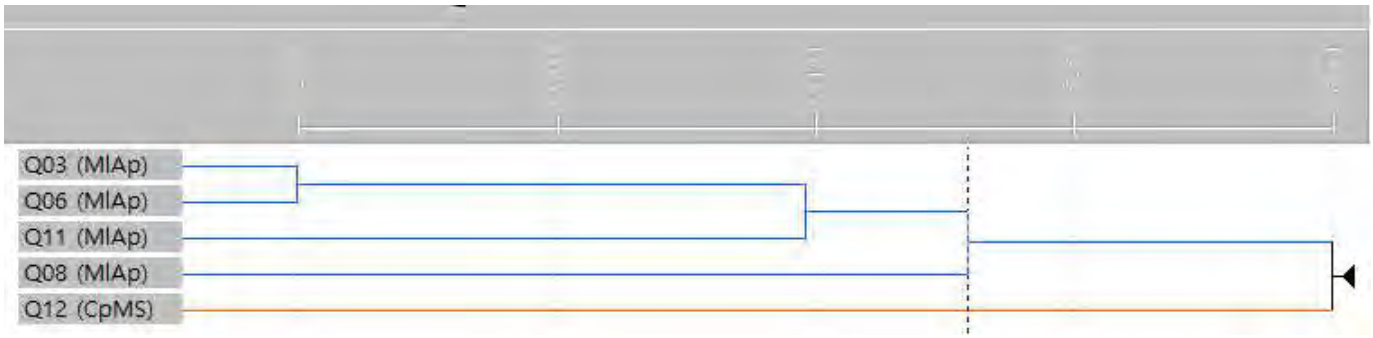

Figure 11 – Quadrat PATN Analysis Dendrogram

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 single site insertion (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, *Callitris/Melaleuca* Shrubland) 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 survey area (DBCA 2022c). 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 field survey and analyses carried out for all quadrats 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 survey area (40.6% of the survey area was mapped as vegetation units MlAp and CpMl) (**Figure 9**) 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 2022).

5.3.1.1 *Threatened Flora*

No EPBC-listed Threatened flora were recorded within the survey 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 survey 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 survey 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 survey 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 (*Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands 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 State 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 survey 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 survey 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 (Wadjemup) 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 survey 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. In comparison to the mean species richness that was recorded by Gibson *et al.* (1994) for FCT SCP 30a, 21.1 species, the recorded species richness values for this assessment are considered low in comparison.

Of the total 32 species recorded, 15.63% 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 survey 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 survey 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 survey 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 CpMl occur as a small, isolated community within the survey area and is considered locally significant due to this factor.

5.3.4.2 *Locally Limited Extent and Distribution*

The vegetation unit CpMl (*Callitris/ Melaleuca* Shrubland) occupies a small portion (≤1%) of the survey area covering an extent of 0.6% (0.6 ha). This vegetation unit is considered limited in its local extent and distribution and is considered locally significant due to this factor.

5.3.5 Summary of Vegetation Significance

The significance of the vegetation units within the survey 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, GtS, LpAp,
Local Significance	Small, isolated communities	CpMl
	Having a limited local extent and/or distribution	CpMl

Table 13 – Summary of Level of Potential Significance for the Recorded Vegetation Units

Vegetation Unit	Overall Significance – Factor of Significance	Area (ha)	% of Survey Area
MlAp *Melaleuca/ Acanthocarpus* Woodland	State significance – Presence of State-listed TEC State significance – Land within the Conservation Estate Regional significance – within an ESA Regional significance – Represented by <30% of pre-European extent	44.39	44.00
ArAp *Acacia/Acanthocarpus* Shrubland	State significance – Land within the Conservation Estate Regional significance – within an ESA	5.20	5.15
CpMl *Callitris/Melaleuca* Shrubland	State significance – Presence of State-listed TEC State significance – Land within the Conservation Estate Regional significance – within an ESA Regional significance – Represented by <30% of pre-European extent Local significance – occurring as a small, isolated community Local significance – limited local extent and/or distribution	0.60	0.60
MlGl *Melaleuca/ Guichenotia* Shrubland	State significance – Land within the Conservation Estate Regional significance – within an ESA	23.00	22.79
OaAp *Olearia/ Acanthocarpus* Shrubland	State significance – Land within the Conservation Estate Regional significance – within an ESA	4.03	4.00
TiSS *Tecticornia* Samphire Shrubland	State significance – Land within the Conservation Estate Regional significance – within an ESA Regional significance – Represented by <30% of pre-European extent	5.70	5.65
GtS *Gahnia* Sedgeland	State significance – Land within the Conservation Estate Regional significance – within an ESA	3.88	3.85
LpAp *Lepidosperma/ Acanthocarpus* Sedgeland	State significance – Land within the Conservation Estate Regional significance – within an ESA Regional significance – Represented by <30% of pre-European extent	3.05	3.02
SlG Spinifex Grassland	State significance – Land within the Conservation Estate Regional significance – within an ESA Regional significance – Represented by <30% of pre-European extent	2.56	2.54
Planted		0.33	0.33
Beach		0.83	0.83
Open Water		0.62	0.61
Cleared		6.69	6.63
	TOTAL	**100.88**	**100**

6 CONCLUSIONS

The key findings and conclusions arising from the flora and vegetation assessment within the survey 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' or 'Degraded' condition.
- Nine vegetation units and four other classifications (Beach, Planted, Open Water and Cleared areas) were defined and mapped within the survey 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 (vegetation association 125) supported by the survey area falls below the 10% retention target in the context of the Swan Coastal Plain, and two vegetation associations relevant to the survey 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 CpMl occurs as a small, isolated community also being limited in its local extent and/or distribution, and is therefore considered locally significant.
- *Lepidium puberulum* (P4) has previously been recorded from one location within the survey area (DBCA 2022a). This species was not recorded to occur within the survey area despite extensive searching in the vicinity of the known recorded location. Further targeted surveys may be appropriate.

7 LIST OF PARTICIPANTS

The personnel who contributed to the project are summarised in **Table 14**.

Table 14 – Project Team

Name	Qualification	Years of Relevant Experience	Role
Kellie Bauer–Simpson Principal Ecologist	BSc. (Biological Science)	23	Project manager, field assessment, flora identification, technical and authorisation review
Lisa Chappell Senior Botanist/Environmental Scientist	BEnvSc. (Hons) (Environmental Science)	19	Field assessment, data management, floristic analysis, GIS mapping, report preparation
Olga Nazarova Botanist/Taxonomist	BSc. (Botany and Genetics)	4	Flora identifications support, technical support, report preparation
Megan Gray Ecologist	BSc. (Environmental Biology)	3	Report preparation
Kelly Hopkinson Graduate Ecologist	BSc. (Biological Science and Conservation Biology)	1	Report preparation
Kristen Bleby Senior Ecologist	BSc. (Natural Resource Management) (Hons), PhD (Wildlife Ecology)	8	Report review
Sarah Beckwith Undergraduate Ecologist		0.5	Field survey, data entry
Will Bauer–Simpson Technician	Cert IV (Health and Safety)	10	Field safety and logistics planning, GIS mapping, spatial analysis, spatial data management
Megan Rabadan 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 Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may 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
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Sternula nereis nereis 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](#) Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat likely to occur within area
[Setonix brachyurus](#) Quokka [229]	Vulnerable	Species or species habitat known to occur within area
PLANT		
[Diuris micrantha](#) Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat may occur within area
REPTILE		
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
SHARK		
[Carcharias taurus (west coast population)](#) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to 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

Scientific Name	Threatened Category	Presence Text
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sphyrna lewini 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 Common Noddy [825]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
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
Migratory Marine Species		
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
Mobula birostris as Manta birostris 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 Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Tringa totanus Common Redshank, Redshank [835]		Roosting known to occur within area
Xenus cinereus 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 Common Sandpiper [59309]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Ardenna pacifica as Puffinus pacificus Wedge-tailed Shearwater [84292]		Breeding 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 overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area overfly marine area

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

Scientific Name	Threatened Category	Presence Text
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area overfly marine area
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area overfly marine area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Numenius madagascariensis 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 Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area overfly marine area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area overfly marine area
Puffinus assimilis Little Shearwater [59363]		Breeding known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula nereis as Sterna nereis Fairy Tern [82949]		Breeding known to occur within area
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
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area
Thinornis cucullatus as Thinornis rubricollis Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area
Tringa brevipes as Heteroscelus brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area overfly marine area

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

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

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

Scientific Name	Threatened Category	Presence Text
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus 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 Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. 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 Flesh-footed Shearwater [82404]	Aggregation	Known to occur
Ardenna pacifica Wedge-tailed Shearwater [84292]	Foraging (in high numbers)	Known to occur
Eudyptula minor Little Penguin [1085]	Foraging (provisioning young)	Known to occur
Hydroprogne caspia Caspian Tern [808]	Foraging (provisioning young)	Known to occur
Larus pacificus Pacific Gull [811]	Foraging (in high numbers)	Former Range
Onychoprion anaethetus Bridled Tern [82845]	Foraging (in high numbers)	Known to occur
Puffinus assimilis tunneyi Little Shearwater [59363]	Foraging (in high numbers)	Known to occur
Sterna dougallii Roseate Tern [817]	Foraging	Known to occur
Sternula nereis Fairy Tern [82949]	Foraging (in high numbers)	Known to occur
Seals		
Neophoca cinerea Australian Sea Lion [22]	Foraging (male)	Likely to occur
Whales		
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Distribution	Known to occur
Eubalaena australis 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	R16	Q12	R01	R02	R15	R04	R18	R05	R17	R07	R13	R09	R14	R10
Araliaceae	*Trachymene coerulea*							+											
Asparagaceae	*Acanthocarpus preissii*	1	+	+	+			+	+	+			+	+	+				+
Asphodelaceae	**Asphodelus fistulosus*					+							+	+			+	+	+
Asphodelaceae	**Trachyandra divaricata*	+	+		+	+	+	+	+	+		+			+	+		+	+
Asteraceae	**Dittrichia graveolens*								+				+				+		+
Asteraceae	*Olearia axillaris*												+	+	+				
Casuarinaceae	*Allocasuarina huegeliana*				+														
Chenopodiaceae	*Rhagodia baccata*								+	+					+	+			
Chenopodiaceae	*Tecticornia indica*																	+	
Chenopodiaceae	*Tecticornia indica* subsp. *bidens*																+		
Crassulaceae	*Cotyledon* sp.	+																	
Cupressaceae	*Callitris preissii*		+				+		+										
Cyperaceae	*Ficinia nodosa*											+				+			
Cyperaceae	*Gahnia trifida*			+							+	+					+	+	
Cyperaceae	*Lepidosperma gladiatum*														+	+			
Cyperaceae	*Lepidosperma pubisquameum*												+						
Euphorbiaceae	**Euphorbia peplus*									+								+	
Fabaceae	*Acacia preissiana*					+						+				+			
Fabaceae	*Acacia rostellifera*				+		+	+	+						+				
Goodeniaceae	*Scaevola crassifolia*							+											+
Haemodoraceae	*Conostylis candicans*									+				+	+	+			
Malvaceae	*Guichenotia ledifolia*		+			+		+	+	+		+							
Myrtaceae	*Agonis flexuosa*						+												
Myrtaceae	*Eucalyptus platypus*						+												
Myrtaceae	*Melaleuca lanceolata*	+	+	+	+	+	+		+										
Pittosporaceae	*Pittosporum ligustrifolium*									+									
Poaceae	*Austrostipa flavescens*								+							+		+	

Family	Taxon	MIAp					CpMI	ArAp	MIGI		GtS		OaAp		LpAp		TiSS		SIG
		Q03	Q06	Q08	Q11	R16	Q12	R01	R02	R15	R04	R18	R05	R17	R07	R13	R09	R14	R10
Poaceae	**Pentameris airoides*			+															
Poaceae	*Poa poiformis*	+	+	+					+				+		+		+		
Poaceae	*Spinifex longifolius*																		+
Poaceae	*Sporobolus virginicus*																+		
Zygophyllaceae	*Roepera* sp.			+															

APPENDIX D – QUADRAT AND RELEVÉ SITE DATA

APPENDIX A – QUADRAT AND RELEVÉ SITE DATA

Site Q03

Date	2 May 2022
Botanist	Kellie Bauer-Simpson and Lisa Chappell
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	Kellie Bauer-Simpson and Lisa Chappell
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	Kellie Bauer-Simpson and Lisa Chappell
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	Kellie Bauer-Simpson and Lisa Chappell
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	Kellie Bauer-Simpson and Lisa Chappell
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	Kellie Bauer-Simpson and Lisa Chappell
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	Kellie Bauer-Simpson and Lisa Chappell
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	Kellie Bauer-Simpson and Lisa Chappell
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	Kellie Bauer-Simpson and Lisa Chappell
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 R09

Date	2 May 2022
Botanist	Kellie Bauer-Simpson and Lisa Chappell
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	Kellie Bauer-Simpson and Lisa Chappell
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		+

Site R13

Date	30 August 2022
Botanist	Kellie Bauer-Simpson and Sarah Beckwith
Quadrat Size	10 x 10 m
NW Corner Coordinates	361714mE 6457868mN
Vegetation Unit	*Lepidosperma/Acanthocarpus* Sedgeland
Slope	Gentle
Landform	Lower slope
Soil Colour	Pale brown
Soil Type	Sand
Litter	10%
Bare Ground	15%
Fire Age	>10 Years
Vegetation Condition	Good
Disturbances/Impacts	Weeds

Species	Height (m)	% Cover
Lepidosperma gladiatum	1.5	8
Ficinia nodosa	1.2	6
Rhagodia baccata	0.6	10
Acacia preissiana	0.5	5
Austrostipa flavescens	0.5	4
**Trachyandra divaricata*	0.5	15
Conostylis candicans	0.2	2

Site R14

Date	30 August 2022
Botanist	Kellie Bauer-Simpson and Sarah Beckwith
Quadrat Size	10 x 10 m
NW Corner Coordinates	362080mE 6457850mN
Vegetation Unit	*Tecticornia* Samphire Shrubland
Slope	Flat
Landform	Wetland
Soil Colour	Brown
Soil Type	Sandy clay
Litter	2%
Bare Ground	5%
Fire Age	>10 Years
Vegetation Condition	Good to Very Good
Disturbances/Impacts	Weeds

Species	Height (m)	% Cover
Gahnia trifida	1.5	30
Tecticornia indica	1	15
**Trachyandra divaricata*	0.6	10
**Asphodelus fistulosus*	0.5	10
Austrostipa flavescens	0.3	8
**Euphorbia peplus*		+

Site R15

Date	30 August 2022
Botanist	Kellie Bauer-Simpson and Sarah Beckwith
Quadrat Size	10 x 10 m
NW Corner Coordinates	361870mE 6457735mN
Vegetation Unit	*Melaleuca/Guichenotia* Shrubland
Slope	Moderate
Landform	Mid-slope
Soil Colour	Pale brown
Soil Type	Sand
Litter	3%
Bare Ground	10%
Fire Age	>10 Years
Vegetation Condition	Good
Disturbances/Impacts	Weeds

Species	Height (m)	% Cover
Acanthocarpus preissii	0.8	15
Rhagodia baccata	0.7	5
Guichenotia ledifolia	0.6	40
**Trachyandra divaricata*	0.3	20
**Euphorbia peplus*	0.1	10
Conostylis candicans		Associated
Pittosporum ligustrifolium		+

Site R16

Date	30 August 2022
Botanist	Kellie Bauer-Simpson and Sarah Beckwith
Quadrat Size	10 x 10 m
NW Corner Coordinates	361857mE 6457782mN
Vegetation Unit	*Melaleuca/Acanthocarpus* Woodland
Slope	Gentle
Landform	Mid-slope
Soil Colour	Brown
Soil Type	Clay loam
Litter	80%
Bare Ground	0%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	Loss of understorey

Species	Height (m)	% Cover
Melaleuca lanceolata	9	80
Acacia preissiana		Associated
**Asphodelus fistulosus*		Associated
Guichenotia ledifolia		Associated
**Trachyandra divaricata*		Associated

Site R17

Date	30 August 2022
Botanist	Kellie Bauer-Simpson and Sarah Beckwith
Quadrat Size	10 x 10 m
NW Corner Coordinates	362359mE 6457778mN
Vegetation Unit	*Olearia/Acanthocarpus* Shrubland
Slope	Moderate
Landform	Hill
Soil Colour	Pale brown
Soil Type	Sand
Litter	1%
Bare Ground	35%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	Rubbish

Species	Height (m)	% Cover
Olearia axillaris	1	8
Acanthocarpus preissii	0.5	6
Conostylis candicans	0.2	7
**Asphodelus fistulosus*		+

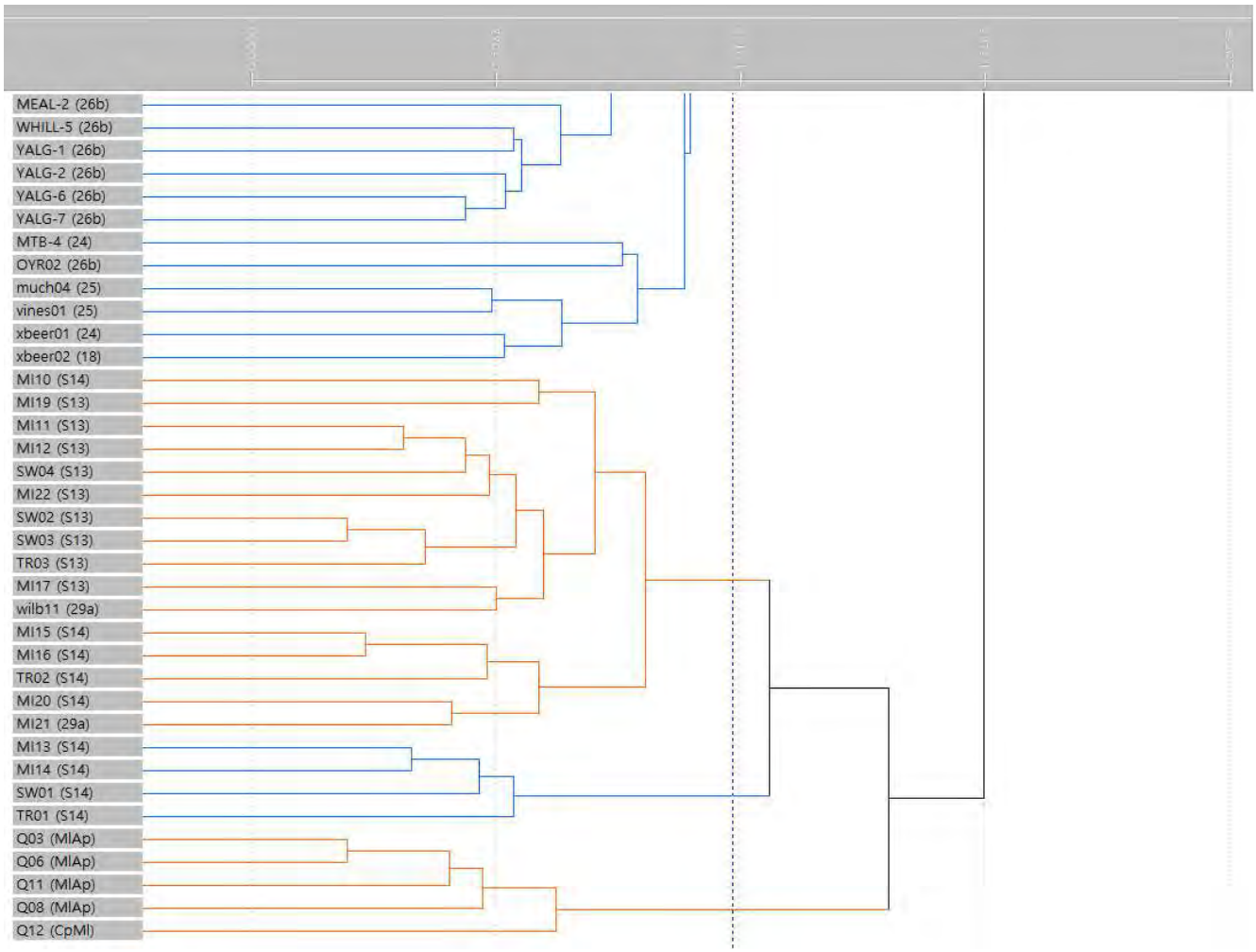
Site R18

Date	30 August 2022
Botanist	Kellie Bauer-Simpson and Sarah Beckwith
Quadrat Size	10 x 10 m
NW Corner Coordinates	362326mE 6457483mN
Vegetation Unit	*Gahnia* Sedgeland
Slope	Flat
Landform	Swamp
Soil Colour	Brown
Soil Type	Loamy sandy clay
Litter	5%
Bare Ground	5%
Fire Age	>10 Years
Vegetation Condition	Good
Disturbances/Impacts	Weeds

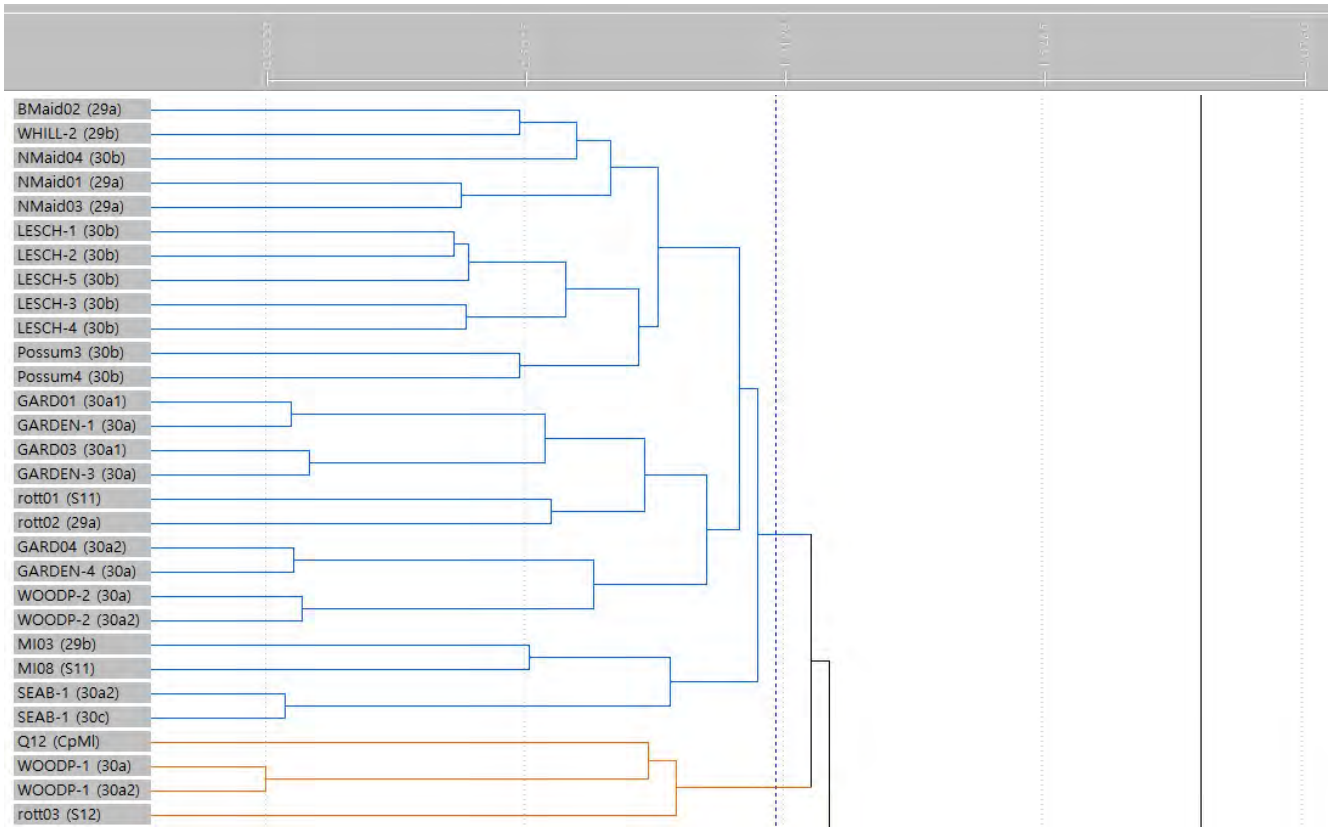
Species	Height (m)	% Cover
Gahnia trifida	1.3	25
Acacia preissiana	1.1	5
Ficinia nodosa	1.1	25
Guichenotia ledifolia	0.6	5
**Trachyandra divaricata*	0.6	10

APPENDIX E – BATCH AND SSI DENDROGRAMS

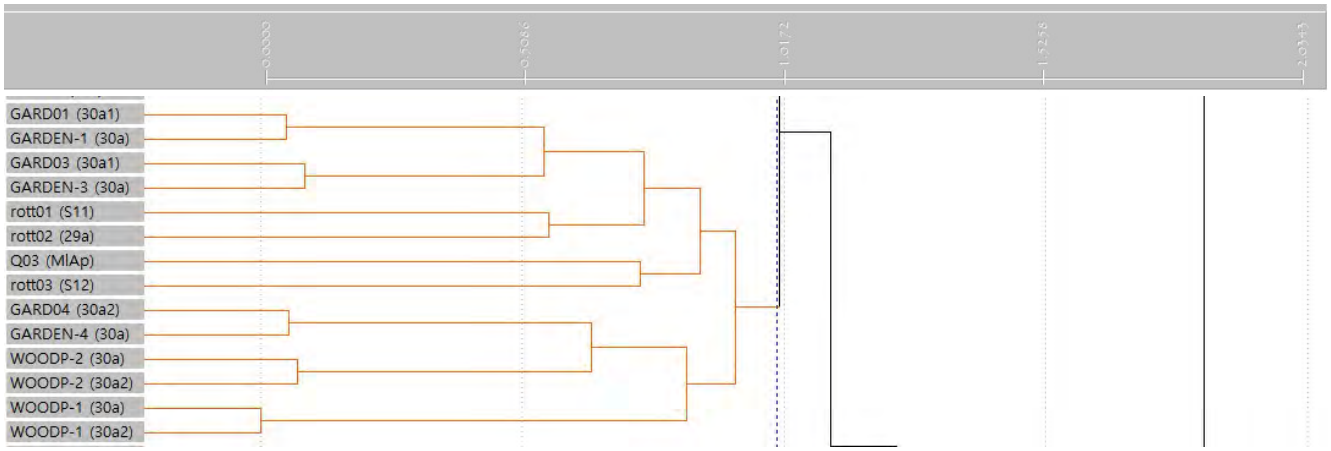
Dendrogram 1 – Excerpt Batch Analysis RIA Quadrats



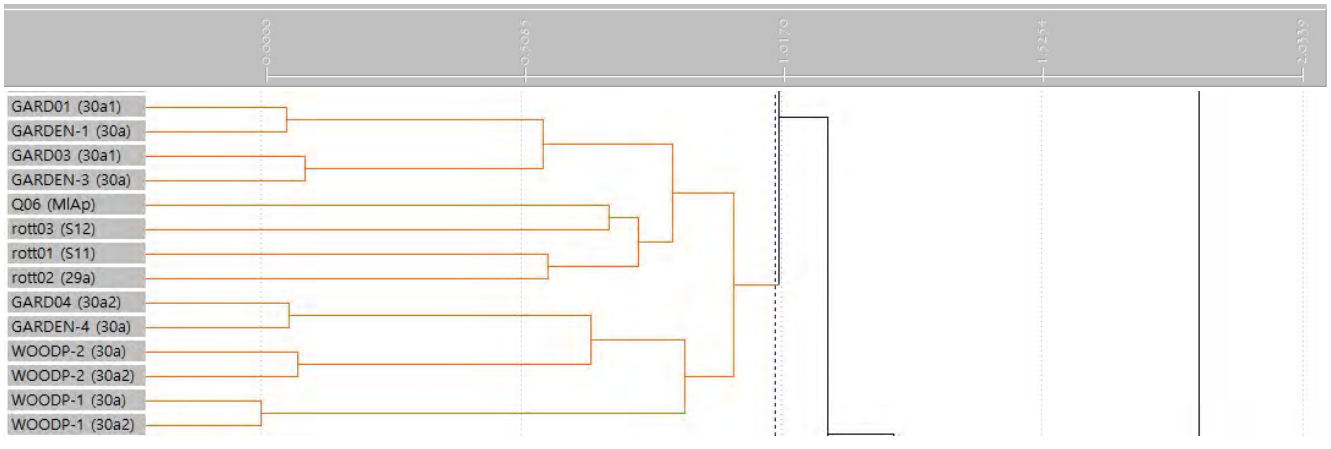
Dendrogram 2– CpMl SSI Q02



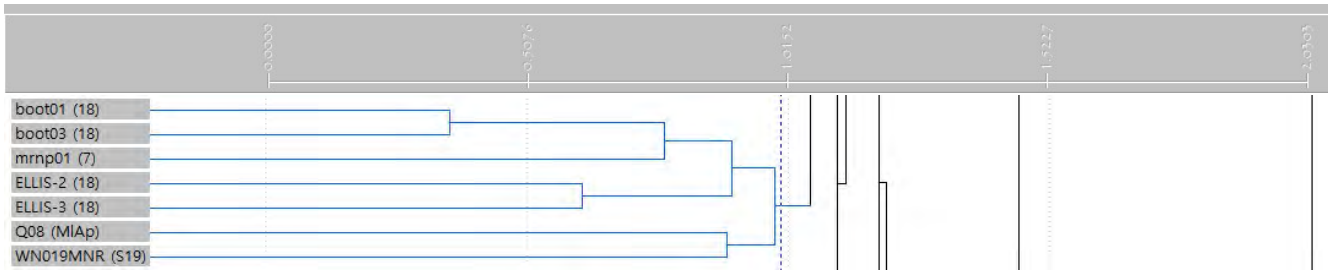
Dendrogram 3 – MlAp SSI Q03



Dendrogram 4 – MlAp SSI Q06



Dendrogram 5 – MlAp SSI Q08



Dendrogram 6– MlAp SSI Q12