Planned Solar Farm
Monkey Mia
Flora and Vegetation Survey

Prepared for Accendo Australia

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OCTOBER 2023

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Executive Summary

Plantecology Consulting was commissioned by Accendo Australia to undertake a detailed flora and vegetation survey of a stand of native vegetation adjacent to the RAC Monkey Mia Dolphin Resort, Monkey Mia in the Shire of Shark Bay. The area of the survey was approximately 3.42ha, which extends south beyond the boundary of the planned site of the solar farm. The area of the subject site for the solar farm is 2.89 ha.

A field survey was undertaken by a botanist from Plantecology Consulting on the 3rd August 2023. A detailed survey of the vegetation was undertaken at four 900 m^2 sampling plots (30m x 30m quadrats) in accordance with the recommended sampling unit size for the Carnarvon Bioregion, selected to adequately sample the flora within a stand. Plots were positioned to sample a representative and homogeneous area (i.e. not located in transitional areas between communities). The location of each corner of a plot was recorded with a hand-held GPS unit and a photograph of the plot taken looking inward to the quadrat. All vascular plant species were recorded and an estimate of the Percentage Cover was made for each species.

A total of 13 native taxa was recorded within the survey area, representing 10 families and 10 genera. The dominant families containing mostly native taxa were Fabaceae (3 native taxa), and Scrophulariaceae (2 native taxa).

The survey identified one native plant community within the survey area:

Acacia ramulosa subsp. *ramulosa* and *Acacia tetragonophylla* Tall Open Shrubland

Tall open shrubland of *Acacia ramulosa* subsp. *ramulosa* and *Acacia tetragonophylla* with scattered *Acacia sclerosperma* subsp. *sclerosperma* over *Eremophila* spp. and sparse forbs.

The vegetation condition of the majority (3.1 ha) of the surveyed area is rated as 'Good', where the vegetation structure remains intact and no weeds are present. The extremely low rainfall experienced by the region in 2023 has resulted in no annual species and almost no herbaceous species being present at the time of the survey. Significant senescence of shrubs (especially *Acacia tetragonophylla* individuals) was observed, although some deaths are likely to have occurred prior to the current year.

Small areas rated as 'Completely Degraded' were mapped for firebreaks and where some spillage of building material had occurred.

No Threatened Flora pursuant to the Biodiversity Conservation Act (2016) nor the EPBC Act (1999) were recorded during the survey.

No Priority Flora pursuant to Western Australian policy were recorded within the survey area.

Most Priority Flora previously recorded near the survey area are perennials and would have been observable if present. Of the annual Priority Flora that have previously been recorded near the survey area, the habitat within the survey area is unsuitable for *Sondottia glabrata* and it is highly unlikely to be present. However, the potential presence of *Chthonocephalus tomentellus* cannot be entirely excluded as the habitat is suitable and the dry conditions experienced in the region this year appears to have prevented the germination of all annuals.

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1 Introduction

Plantecology Consulting was commissioned by Accendo Australia to undertake a detailed flora and vegetation survey of a stand of native vegetation adjacent to the RAC Monkey Mia Dolphin Resort, Monkey Mia in the Shire of Shark Bay (Figure 1), to support the establishment of a solar farm. The area of the survey was approximately 3.42ha, which extends south beyond the boundary of the planned site of the solar farm. The area of the subject site for the solar farm is 2.89 ha.

1.1 Existing Environment

The survey area is situated on the top of a rise overlooking the Monkey Mia Resort and has a northerly aspect. It is currently vegetated by acacia scrub and is adjacent to the existing wastewater treatment plant (WWTP) for the Monkey Mia Dolphin Resort. Some impacts from past land use and the current activities of the adjacent WWTP are visible with some remnant debris and scattered material on the survey area (Plate 1).

1.2 Previous Surveys

Weston (2002) surveyed the Monkey Mia area for the expansion of the existing WWTP, and the area for that study overlaps with the current survey area. Weston (2002) identified two vegetation types: an *Acacia ramulosa* thicket and an *Acacia ramulosa – Acacia tetragonophylla* Scrub. The latter type was mapped as occurring over the area of the current survey and reported to be well-represented on both the Peron Peninsula and the adjacent mainland. Weston (2002) noted that few herbaceous plants and grasses were recorded and ascribed this to the drought and grazing from feral mammals. No conservation significant flora were recorded within the study area of Weston (2002), although some individuals of *Acacia drepanophylla* (P3) were noted nearby to the south east.

360 Environmental (2019) surveyed a 13.5 ha site near Denham, which consisted of a single community: a Myrtaceae Low Shrubland. This vegetation type does not occur within the current survey area. Two Priority Flora (PF) were reported: *Acanthocarpus rupestris* (P2), which occurs on red sand or limestone, and *Olearia occidentissima* (P2), which occurs on coastal limestone cliffs. The habitat for the latter taxon does not occur within the survey area.

Keighery and Muir (2008) surveyed the vegetation of nearby Faure Island and reported that most of the island consists of undulating red sandplains with a low *Acacia ramulosa* shrubland, with *Acacia tetragonophylla* or *Acacia ligulata* as sometimes dominating. This vegetation type is similar to that found by Weston (2002) as occurring adjacent to the WWTP. A survey of the broader southern Carnarvon Basin established some plots on the western side of Peron Peninsula and recorded *Acacia* shrublands dominated by *Acacia sclerosperma* and *Acacia ramulosa* subsp. *linophylla* (Keighery et al. 2000), similar to that recorded by Weston (2002) at the WWTP.

Mattiske Consulting Pty Ltd (2005) surveyed an extensive area south of Shark Bay approximately 100 km from the current survey area and recorded the presence of a 'Tall Open Shrubland of *Acacia sclerosperma* subsp. *sclerosperma* and *Acacia ramulosa* var. *ramulosa* over *Eremophila maitlandii* over *Ptilotus obovatus* var. *obovatus*' community. This community also included *Acacia tetragonophylla* and is descriptively similar to the *Acacia ramulosa – Acacia tetragonophylla* Scrub reported by Weston (2002) and gives support to his statement that this vegetation type is widespread in the region.

1.3 Climate

The Monkey Mia area experiences a hot semi-arid climate of hot dry summers and mild winters. Long-term climatic averages indicate the survey area is located in an area of low rainfall, receiving 221 mm on average annually (data for Denham, station number 6044, the nearest currently reporting station with sufficient longevity) (Bureau of Meteorology 2023) with the majority of rainfall received between

May and August. The area experiences rainfall on an average of 23 days per year. Mean maximum temperatures range from 21.8 °C in July to 31.8 °C in February. Mean minimum temperatures range from 12.8 °C in July, to 22.8 °C in February.

Rainfall recorded in 2023 for the local area was well below long-term averages (Figure 2). The rainfall received at Denham is consistent with the 1st decile (bottom 10%) of records.

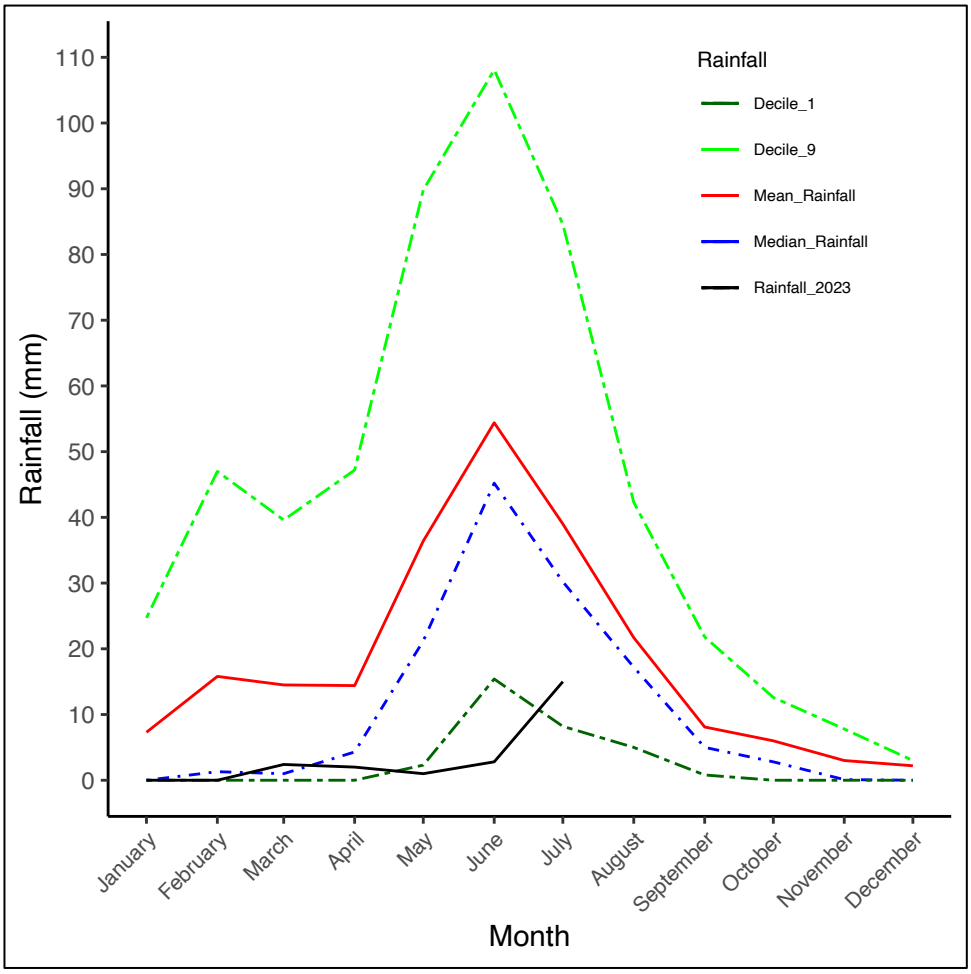

Figure 2: Rainfall in 2023 for the survey area, with annual comparison data for mean, median, and 1st and 9th deciles (data from Denham station number 6044. Source: Bureau of Meteorology)

1.4 Soils

The Atlas of Australian Soils maps the soils for the survey area as Map Unit A19, which consists of brown calcareous dune sands (Natural Resource Information Centre 1991). Tille (2006) places the survey area within the Shark Bay soil-landscape zone, which comprises sandplains of red deep sands with calcareous deep sands and shallow loams, and some red deep sandy duplexes. Either description is consistent with that observed within the survey area (Plate 2).

1.5 Conservation Significant Flora

Under the Biodiversity Conservation Act 2016 ('BC Act'), the Minister for the Environment produces a gazetted list of Threatened Flora under three categories: Critically Endangered, Endangered and Vulnerable. The Department of Biodiversity, Conservation and Attractions (DBCA) also produces a list of Priority Flora that have not been assigned statutory protection under the BC Act but may be under

some degree of threat (DBCA 2023a). The DBCA recognises four Priority Flora levels. The definitions for each category of Threatened and Priority Flora are shown in Appendix E.

As well as protection under State legislation, selected flora are also afforded statutory protection at a Federal level pursuant to the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The EPBC Act provides for the protection of Threatened species, pursuant to Schedule 1 of the Act, and are defined as "Critically Endangered", "Endangered", "Vulnerable" or "Conservation Dependent" under Section 179. Definitions of these categories are shown in Appendix E. Any action likely to have a significant impact on a species listed under the EPBC Act requires approval from the Commonwealth Minister for the Environment.

Searches of the State databases (Reference Number: 35-0623FL) identified 67 conservation significant taxa with the potential to occur within the survey area (Table 1). Those records within approximately 10 km of the survey area are shown in Figure 3. Of the identified taxa, one is listed as Threatened under the BC Act. *Eucalyptus beardiana* is a mallee growing to between 3 and 5 m in height. It occurs on sand dunes from the Shark bay region to east of Geraldton. The nearest record to the survey area for *Eucalyptus beardiana* is 74 km to the south.

Seven Priority Flora have been recorded within approximately 10 km of the survey area (Figure 2). Of these, the habitats for *Sondottia glabrata* (saline flats) and *Olearia occidentissima* (coastal limestone cliffs) do not occur within the survey area. The habitat for each of the remaining taxa of *Lepidium biplicatum* (coastal regions), *Chthonocephalus tomentellus* (sand dunes), *Grevillea rogersoniana* (red sand), *Triodia plurinervata* (red to orange-brown sand dunes) and *Acacia drepanophylla* (red clay or loam over limestone) is present within the survey area and each taxon has the potential to occur there. *Acacia drepanophylla* has the highest likelihood of occurring within the survey area as it was observed nearby by Weston (2002).

Table 1: Threatened and Priority Flora potentially occurring within the survey area based on database searches. (VU = Vulnerable; EN = Endangered; CR = Critically Endangered; T = Threatened; 1 – 4 = Priority Flora Category)

Taxon	PWS Ranking	EPBC Act Category	Flowering Period
Abutilon sp. Hamelin (A.M. Ashby 2196)	2		Jul-Sep
Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3		-
Abutilon sp. Quobba (H. Demarz 3858)	2		Jul-Sep
Acacia ampliata	1		Apr – Aug, Oct – Dec
Acacia drepanophylla	3		May – Jul
Acacia sclerosperma subsp. *glaucescens*	3		Jul – Aug
Acacia subrigida	2		Aug – Oct
Acanthocarpus parviflorus	3		May – Jun
Acanthocarpus rupestris	2		May – Jun
Adenanthos acanthophyllus	2		Apr – Jul, Dec
Angianthus microcephalus	2		Sep – Dec
Anthocercis intricata	3		Jun – Sep
Atriplex spinulosa	1		-
Balladonia aervoides	3		-
Beyeria cinerea subsp. cinerea	3		-
Boronia crenulata subsp. Shark Bay (G. Cockerton 5187)	1		Aug

Taxon	PWS Ranking	EPBC Act Category	Flowering Period
Bossiaea calcicola	3		Jul – Sep
Calandrinia operta	1		Aug – Oct
Calandrinia rubrisabulosa	3		Sep-Oct
Calandrinia sp. Edel Land (F. Obbens FO 01/17)	2		-
Carpobrotus sp. Thevenard Island (M. White 050)	3		Aug
Chthonocephalus muellerianus	2		Sep
Chthonocephalus spathulatus	3		Aug
Chthonocephalus tomentellus	2		Aug – Nov
Corynotheca acanthoclada	1		-
Dasymalla glutinosa	3		-
Dicrastylis linearifolia	3		Nov – Dec
Dicrastylis micrantha	3		Sep – Dec
Dicrastylis sp. Denham (M. Lewis 42/92)	1		-
Eremophila cuneata	1		-
Eremophila occidens	2		Aug – Sep
Eremophila splendens	1		Sep
Eucalyptus beardiana	T	VU	Aug – Sep
Eucalyptus zopherophloia	4		Oct – Jan
Frankenia glomerata	4		Nov
Grevillea rogersoniana	3		Aug – Oct
Grevillea speckiana	1		
Jacksonia dendrospinosa	4		Nov
Lepidium biplicatum	3		Sep
Lepidium puberulum	4		Jul – Aug, Oct – Nov
Lepidium scandens	3		Aug – Sep
Lepidobolus densus	4		Aug – Sep
Lysiandra fuernrohrii	3		-
Macarthuria intricata	3		Sep – Dec
Melaleuca huegelii subsp. *pristicensis*	3		Sep – Oct
Millotia depauperata	1		Aug – Sep
Olearia occidentissima	2		Jul – Sep
Orobanche cernua var. *australiana*	3		-
Physopsis chrysophylla	3		Sep – Jan
Ptilotus alexandri	2		Aug – Oct
Ptilotus unguiculatus	1		-
Rhodanthe oppositifolia subsp. *ornata*	2		Jul – Aug
Rhodanthe sp. Overlander (P.S. Short 2096)	1		Oct
Scaevola chrysopogon	2		Aug – Oct
Schoenia filifolia subsp. arenicola	1		Aug – Sep
Scholtzia sp. Folly Hill (M.E. Trudgen 12097)	2		Aug or Oct
Sclerolaena stylosa	1		-
Sondottia glabrata	2		Sep – Oct
Spergularia nesophila	3		-
Stenanthemum divaricatum	3		-
Tetragonia coronata	3		Jul

Taxon	PWS Ranking	EPBC Act Category	Flowering Period
Thryptomene caduca	3		Jul – Sep
Thryptomene repens	2		Aug – Sep
Thryptomene sp. Carrarang (M.E. Trudgen 7420)	1		-
Triodia bromoides	4		Jul – Oct
Triodia plurinervata	3		May – Jul, Sep – Oct
Verticordia dichroma var. *syntoma*	3		Oct – Nov

1.6 Conservation Significant Communities

The DBCA defines an ecological community as "a naturally occurring assemblage that occurs in a particular type of habitat" (DBCA 2023b). A Threatened Ecological Community (TEC) is one that has declined in area or was originally limited in distribution. Uncommon ecological communities that do not strictly meet TEC defined criteria, or are inadequately defined, are listed by the DBCA as a Priority Ecological Community (PEC). Definitions of the categories of Threatened and Priority Ecological Communities are given in Appendix E.

As well as protection under State legislation, selected ecological communities are also afforded statutory protection at a Federal level pursuant to the EPBC Act. The EPBC Act provides for the protection of TECs, which are listed under section 181 of the Act, and are defined as "Critically Endangered", "Endangered" or "Vulnerable" under Section 182. Similar to flora listed under the EPBC Act, any action likely to have a significant impact on a TEC listed under the EPBC Act requires Commonwealth approval.

A search of the State Threatened Communities database (Reference Number: 23-0623EC) found that three PECs endorsed under State legislation are recorded as occurring within the Shark Bay environs:

- Hypersaline microbial community number 2 (Hamelin Pool stromatolites) (Priority 1);
- Salune Land System (Priority 3); and
- Tamala Land System (Priority 3).

The nearest occurrence of a terrestrial conservation significant community to the survey area is the 'Salune Land System', located approximately 65 km to the east of the survey area (Figure 4).

1.7 Environmentally Sensitive Areas

The survey area is located within the Shark Bay World Heritage Area and is therefore a declared Environmentally Sensitive Area pursuant to section 51B of the *Environmental Protection Act 1986*. The Shark Bay World Heritage Area has been declared because it is a refuge for many globally threatened species of plants and animals, the presence of stromatolites, dugong populations, and extensive seagrass beds. Exemptions for vegetation clearing under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 do not apply in an Environmentally Sensitive Area.

1.8 Purpose

The purpose of the survey was to assess the botanical values within the survey area by:

- Undertaking a detailed flora and vegetation survey in accordance with the Environmental Protection Authority's (EPA) Technical Guidance: Flora and Vegetation Survey for Environmental Impact Assessment (2016).
- Identifying the presence of any Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs);
- Undertaking a systematic search for all vascular plant taxa present; and
- Recording the locations and numbers present of any Threatened Flora and Priority Flora identified at the time of the field survey.

2 Methods

2.1 Field Survey

A field survey was undertaken by a botanist from Plantecology Consulting on the 3rd August 2023. A detailed survey of the vegetation was undertaken at four 900 m^2 sampling plots (30m x 30m quadrats) in accordance with the recommended sampling unit size for the Carnarvon Bioregion, selected to adequately sample the flora within a stand (Figure 4). Plots were positioned to sample a representative and homogeneous area (i.e. not located in transitional areas between communities). The location of each corner of a plot was recorded with a hand-held GPS unit and a photograph of the plot taken looking inward to the quadrat. All vascular plant species were recorded and an estimate of the Percentage Cover was made for each species.

Environmental data recorded included topographic position, aspect, slope, soil colour and texture class, rock outcropping, litter cover as well as the degree of disturbance and an estimate of the time since the last fire event. The condition of the vegetation of the survey area was assessed to assist in determining the conservation values of the survey area. The vegetation condition was rated according to Trudgen (1988), a vegetation condition scale commonly used in the Eremaean and Northern Botanical provinces. The categories are listed and defined in Table 2. Data on the vegetation structure was also recorded and included the height of the three main strata and the dominant species within each stratum. The vegetation structural description follows that of the National Vegetation Information System (ESCAVI 2003).

Table 2: Vegetation Condition Scale (Trudgen 1988)

Vegetation Condition	Definition
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

All plant specimens collected during the field survey were dried, pressed and then sorted in accordance with requirements of the Western Australian Herbarium. Identification of specimens occurred through comparison with named material and through the use of taxonomic keys. Taxonomic determinations were made using reference material at the Western Australian State Herbarium. Taxa names utilise the current terminologies from Western Australian Herbarium (1998-). Family names utilise the revised phylogeny of the Angiosperm Phylogeny Group - APGIII Western Australian Herbarium (1998-).

2.2 Survey Limitations

Various factors can limit the effectiveness of a vegetation survey. Pursuant to EPA Technical Guidance: Flora and Vegetation Survey for Environmental Impact Assessment (EPA 2016), these factors have been identified and their potential impact on the effectiveness of the survey has been assessed (Table 3).

The survey was undertaken in August 2023, as this period is when the highest number of species have been recorded as flowering in the Carnarvon Bioregion. The survey would ordinarily have intercepted the flowering period of most taxa of conservation concern with the potential to occur within the survey area. However, the rainfall for the area in the six months prior to the survey totalled only 14.2 mm, well below the average of 181.8 mm (data for Denham). This period of very dry conditions would have limited the amount of water available for plant growth and it is expected that this would have affected the local species' phenology significantly.

Table 3: Potential limitations affecting the vegetation survey

Potential limitations	Constraint	Comment
Availability of contextual information	No	Sufficient regional and local information was available to place the survey area in its environmental context.
Competency and experience of the botanists	No	The survey was undertaken by botanists with a comprehensive knowledge of Western Australian vegetation, with at least 20 years experience in vegetation surveys in Western Australia.
Seasonality	Major	The rainfall in the preceding six months was well below average, while minimum and maximum temperatures were close to the mean for the same period.
Adequate coverage and intensity of survey	No	The survey area was traversed on foot. It is considered the survey quadrats and mapping points provided adequate coverage of the survey area.
Proportion of Flora identified	Major	The flora present and identifiable were mostly perennial shrubs as few herbaceous species were recorded likely due to the low rainfall.
Disturbance	No	The vegetation was mostly intact, with disturbance from grazing and debris visible.
Resources	No	Adequate resources were available to conduct the survey.
Access restrictions	No	All parts of the survey area were accessible

3 Results

3.1 Flora

3.1.1 Floristic Summary

A total of 13 native taxa was recorded within the survey area, representing 10 families and 10 genera. The dominant families containing mostly native taxa were Fabaceae (3 native taxa), and Scrophulariaceae (2 native taxa). For a complete species list and the individual plot data refer to Appendix A and Appendix B, respectively.

3.2 Vegetation

3.2.1 Plant Associations

The survey identified one plant community within the survey area (Figure 5):

Acacia ramulosa subsp. *ramulosa* and *Acacia tetragonophylla* Tall Open Shrubland (Plates 3-6)

Tall open shrubland of *Acacia ramulosa* subsp. *ramulosa* and *Acacia tetragonophylla* with scattered *Acacia sclerosperma* subsp. *sclerosperma* over *Eremophila* spp. and sparse forbs.

This vegetation type occupies the entire survey area, except for firebreaks and infrastructure areas that are part of the existing WWTP (Figure 5).

3.2.2 Vegetation Condition

The vegetation condition of the majority (3.1 ha) of the 3.42 ha is rated as 'Good', where the vegetation structure remains intact and no weeds are present (Figure 6; Table 4). The extremely low rainfall experienced by the region in 2023 has resulted in no annual species and almost no herbaceous species being present at the time of the survey. Significant senescence of shrubs (especially *Acacia tetragonophylla* individuals) was observed, although some deaths are likely to have occurred prior to the current year.

Small areas rated as 'Completely Degraded' were mapped for firebreaks and where some spillage of building material had occurred.

Table 4: Calculated areas for condition ratings within the survey area.

Condition Rating	Area (Ha)
Good	3.1294
Completely Degraded	0.2906
Total	3.42

3.3 Conservation Significance

No TECs or PECs are inferred to occur within the survey area. The land system mapped for the survey area is the Sandplain Land System (Payne et al. 1987), which consists largely of *Acacia ramulosa* shrublands on extensive red sand plains, and the vegetation within the survey area is consistent with this description. The two terrestrial PECs are known to occur in the wider region are both coincident with described land systems. The Salune Land System consists of alluvial plains and saline flats interspersed by sandy dunes (Payne et al. 1987). Although the sandy dunes also supports *Acacia ramulosa* shrublands, the nearest occurrence is 65 km east of the survey area on the mainland. The Tamala Land System is mapped as occurring approximately 100 km to the south of the survey area and consists of variable shrublands on thin sands overlaying limestone. This description is inconsistent with the habitat observed for the survey area.

No Threatened Flora pursuant to the Biodiversity Conservation Act (2016) nor the EPBC Act (1999) were recorded. No Priority Flora pursuant to Western Australian policy were recorded within the survey area. Of the seven taxa that have been recorded within 10 km of the survey area, five are perennials and would have been easily observable at the time of the survey. Another (*Sondottia glabrata* P2) is an annual but occurs on saline flats, a habitat type that is not present within the survey area. The final taxon (*Chthonocephalus tomentellus* P2) is an annual herb that occurs on red sands of undulating plains (Western Australia Herbarium 1998-) and flowers from August through to November. The timing of the survey was appropriate to intercept the usual flowering period of the species but the drier than average conditions prevailing in 2023 has likely prevented germination of many annuals within the region.

3.4 Weeds

No exotics (weeds) were recorded during the survey and therefore no Declared Pests under the Biosecurity and Agriculture Management Act 2007 were observed within the survey area.

4 Discussion

The results of the survey confirm the findings of Weston (2002). The vegetation within the survey area consists of a single type, an *Acacia ramulosa* subsp. *ramulosa* and *Acacia tetragonophylla* Tall Open Shrubland. This type occurs extensively on sand dunes and plains in the broader region and is not listed as a PEC nor a TEC under either State or Commonwealth legislation.

No Threatened or Priority Flora were recorded within the survey area. Most Priority Flora previously recorded near the survey area are perennials and would have been observable if present. Of the annual Priority Flora that have previously been recorded near the survey area, the habitat within the survey area is unsuitable for *Sondottia glabrata* and it is highly unlikely to be present. However, the potential presence of *Chthonocephalus tomentellus* cannot be entirely excluded as the habitat is suitable and the drought experienced in the region this year appears to have prevented the germination of all annuals. *Chthonocephalus tomentellus* was also not recorded within the survey area by Weston (2002) but that survey was conducted in January outside the normal flowering period for the species. Weston (2002) also noted extremely dry conditions prevailing prior to the 2002 survey.

Although rainfall in the region is highly variable, the current dry conditions are consistent with the driest 10% of years recorded. The lack of rainfall in the period preceding the survey resulted in the vegetation condition of the survey area being rated as only 'Good'. Some debris is still observable within the survey area and noticeable senescence of shrubs has occurred. The level of grazing is difficult to assess due to the absence of annual species, but there is likely to be some impact from grazing animals. The drought has likely also prevented any weed species that may be present from germinating and thus why none were recorded.

5 Summary

The vegetation within the survey area planned for the Monkey Mia Solar Farm consists of a vegetation type (*Acacia ramulosa* subsp. *ramulosa* and *Acacia tetragonophylla* Tall Open Shrubland) that is widespread in the region and is not considered to be of conservation concern. No Threatened or Priority Flora were recorded within the survey area but the current lack of rainfall is likely to have prevented the germination of many annual species. The presence of annual species of conservation significance was not observed but cannot be definitively dismissed as both this survey and the previous survey by Weston (2002) were affected by lower than normal rainfall in the region.

6 References

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Figures

Figure 1: Locality Plan Monkey Mia Solar Farm Flora and Vegetation Survey

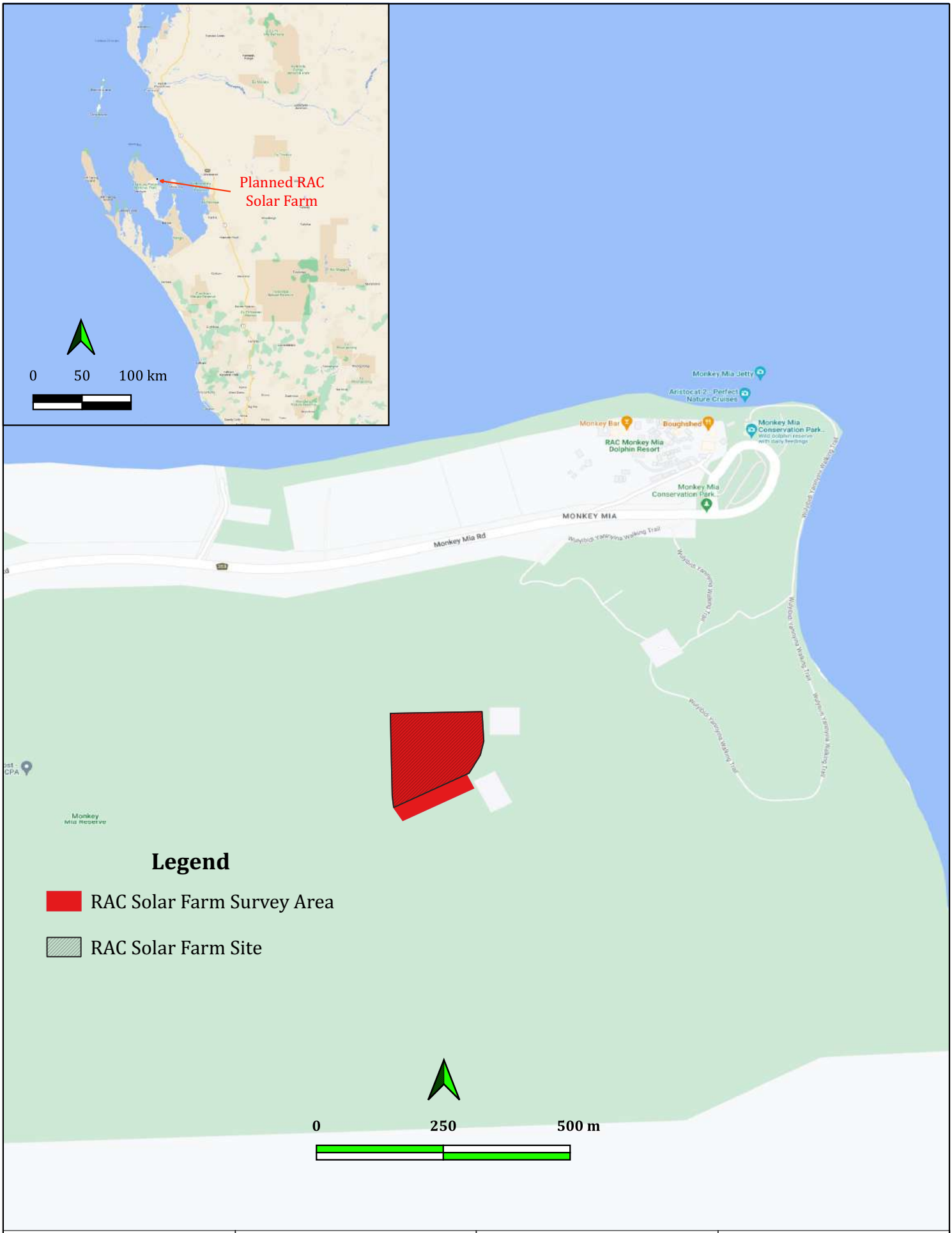
Figure 2: Rainfall in 2023 for the survey area, with annual comparison data for mean, median, and 1st and 9th deciles (data from Denham station number 6044. Source: Bureau of Meteorology; see Page 2)

Figure 3: Conservation Significant Flora from the Local Region

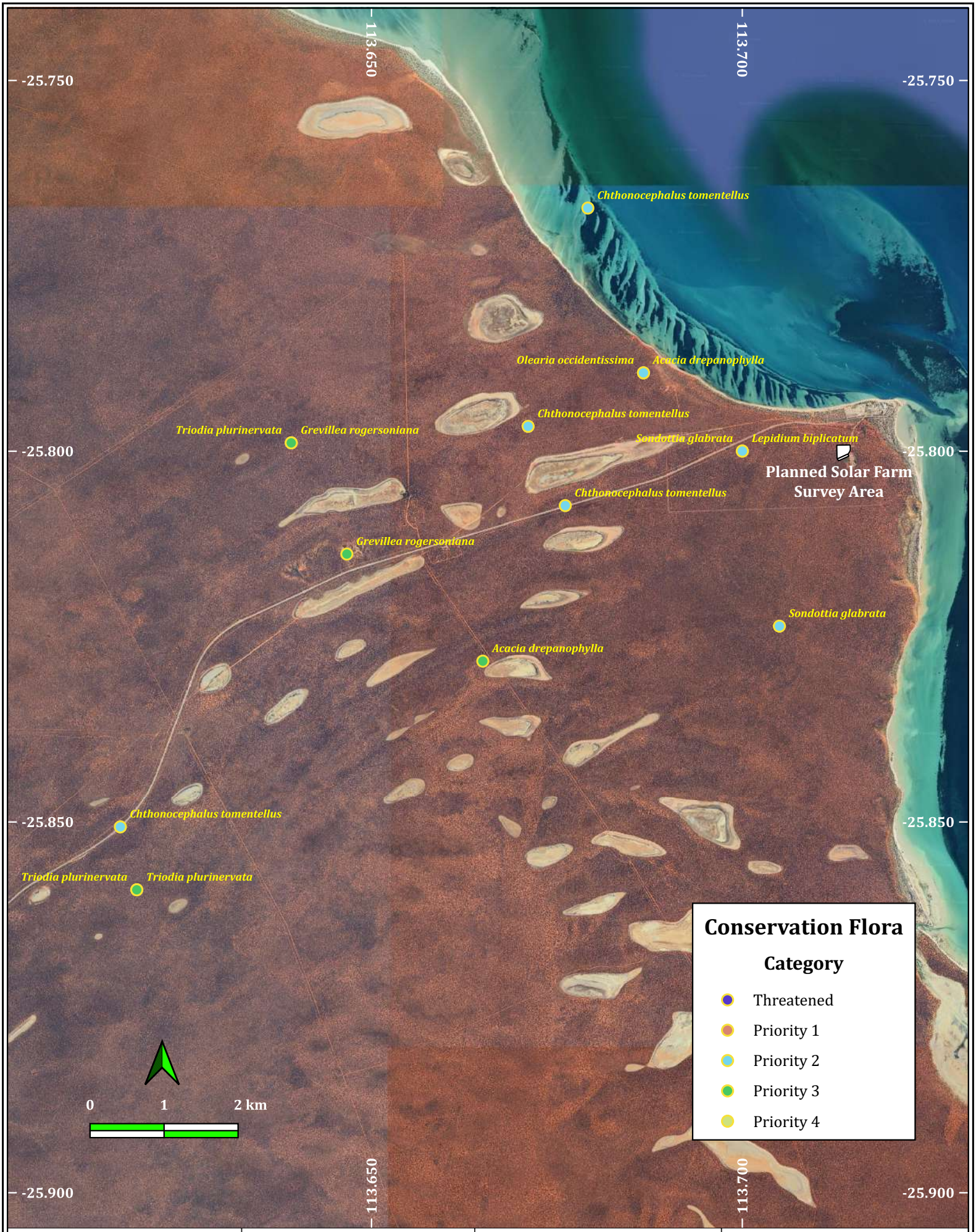
Figure 4: Conservation Significant Communities with Potential to Occur within the Survey Area

Figure 5: Plant Communities

Figure 6: Vegetation Condition



Plantecology CONSULTING 50 New Cross Rd Kingsley WA 6026	Scale: 1:7500 Basemap Source: Google Road Datum: GDA2020 Projection: EPSG 7844	Client: Accendo Australia Project: Planned Solar Farm Flora Survey Location: Monkey Mia Rd, Monkey Mia Author: S.T.S. Chalwell Drawn: S.T.S. Chalwell	**Figure 1: Locality Plan**



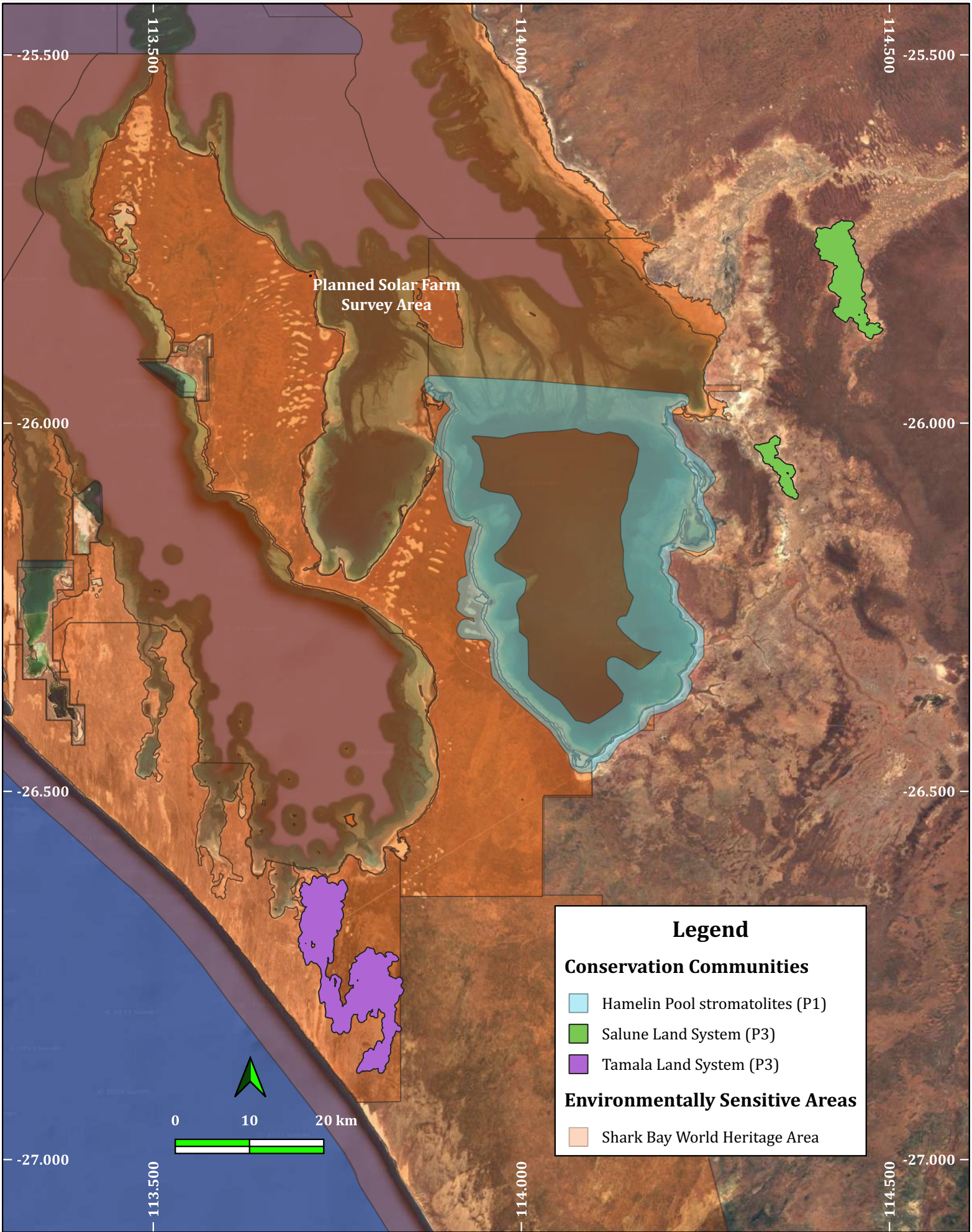
Plantecology CONSULTING

50 New Cross Rd Kingsley WA 6026

Scale: 1:50 000
Basemap Source: Google Satellite
Datum: GDA2020
Projection: EPSG 7844

Client: Accendo Australia
Project: Planned Solar Farm
Location: Monkey Mia Rd, Monkey Mia
Author: S.T.S. Chalwell
Drawn: S.T.S. Chalwell

Figure 3: Conservation Significant Flora



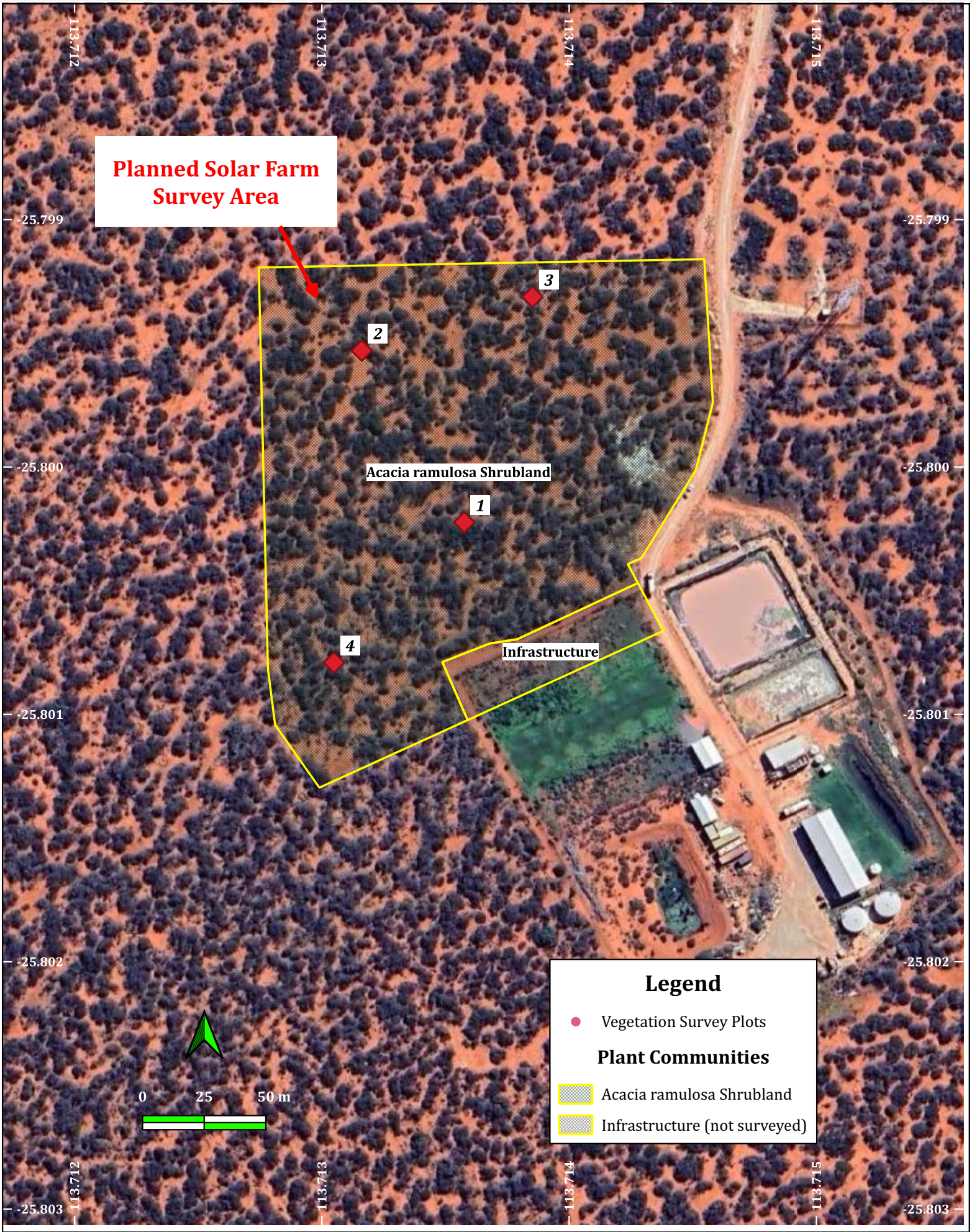
Plantecology CONSULTING

50 New Cross Rd Kingsley WA 6026

Scale: 1:500 000
Basemap Source: Google Satellite
Datum: GDA2020
Projection: EPSG 7844

Client: Accendo Australia
Project: Planned Solar Farm
Location: Monkey Mia Rd, Monkey Mia
Author: S.T.S. Chalwell
Drawn: S.T.S. Chalwell

Figure 4: Conservation Significant Communities

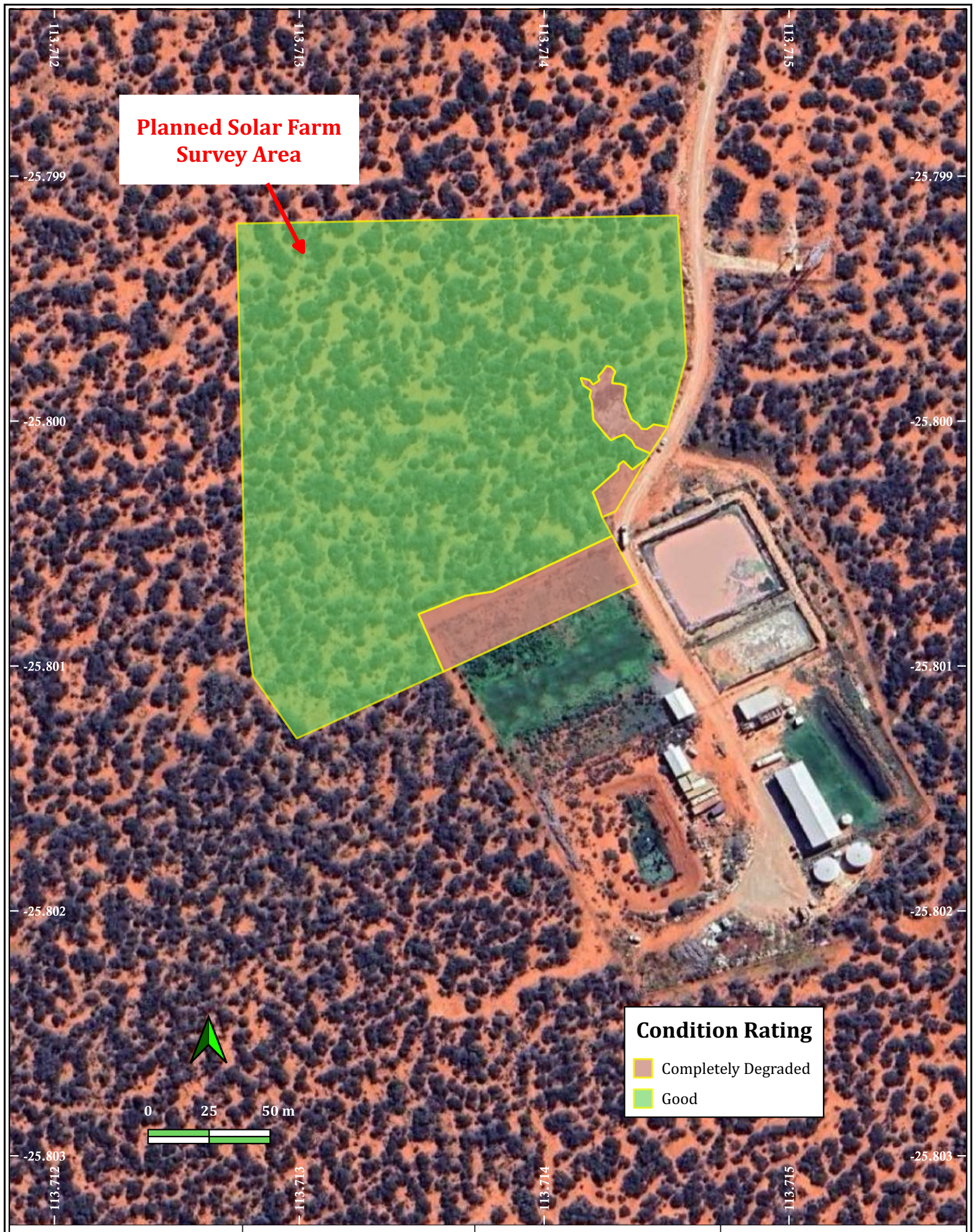


Plantecology CONSULTING
50 New Cross Rd Kingsley WA 6026

Scale: 1:1 500
Basemap Source: Google Satellite
Datum: GDA2020
Projection: EPSG 7844

Client: Accendo Australia
Project: Planned Solar Farm
Location: Monkey Mia Rd, Monkey Mia
Author: S.T.S. Chalwell
Drawn: S.T.S. Chalwell

Figure 5: Plant Communities



Plantecology CONSULTING

50 New Cross Rd Kingsley WA 6026

Scale: 1:1 500
Basemap Source: Google Satellite
Datum: GDA2020
Projection: EPSG 7844

Client: Accendo Australia
Project: Planned Solar Farm
Location: Monkey Mia Rd, Monkey Mia
Author: S.T.S. Chalwell
Drawn: S.T.S. Chalwell

Figure 6: Vegetation Condition

Plates

Plate 1: Historical debris within the survey area.

Plate 2: View of soil profile near Plot 1.

Plate 3: View of sampling Plot 1: *Acacia ramulosa* subsp. *ramulosa* and *Acacia tetragonophylla* Tall Open Shrubland.

Plate 4: View of sampling Plot 2: *Acacia ramulosa* subsp. *ramulosa* and *Acacia tetragonophylla* Tall Open Shrubland.

Plate 5: View of sampling Plot 3: *Acacia ramulosa* subsp. *ramulosa* and *Acacia tetragonophylla* Tall Open Shrubland.

Plate 6: View of sampling Plot 4: *Acacia ramulosa* subsp. *ramulosa* and *Acacia tetragonophylla* Tall Open Shrubland.

Appendix A

List of flora recorded within the survey area, including opportunistically observed taxa.

NB: * indicates introduced flora

Family	Taxon
Asparagaceae	*Thysanotus manglesianus/patersonii* complex
Proteaceae	*Persoonia bowgada*
Fabaceae	*Acacia ramulosa* subsp. *ramulosa* *Acacia sclerosperma* subsp. *sclerosperma* *Acacia tetragonophylla*
Surianaceae	*Stylobasium spathulatum*
Sapindaceae	*Alectryon oleifolius* subsp. *oleifolius*
Santalaceae	*Exocarpos aphyllus*
Amaranthaceae	*Ptilotus ? divaricatus*
Chenopodiaceae	*Enchylaena tomentosa* var. *tomentosa* *Rhagodia latifolia*
Scrophulariaceae	*Eremophila maitlandii*
Asteraceae	*Asteraceae* sp.

Appendix B

Site x species matrix of flora recorded within plots in the survey area.

Taxon	Plot 1	Plot 2	Plot 3	Plot 4
Acacia ramulosa subsp. *ramulosa*	30	30	15	20
Acacia sclerosperma subsp. *sclerosperma*		2		
Acacia tetragonophylla	4	3	3	2
Asteraceae sp.	0.1		0.1	0.1
Eremophila maitlandii			5	2
Exocarpos aphyllus		1		
Persoonia bowgada	1		1	
Ptilotus ? divaricatus				0.1
Stylobasium spathulatum	0.5	1	1	0.5
Thysanotus manglesianus/patersonii complex	0.1			

Appendix C

Sampling plot environmental data

Site Name	Latitude	Longitude	SiteType	Date	Topography	Slope (°)	Aspect	Soil Colour	Soil Depth (cm)	Texture	Fire Interval	Graze Level	Disturbance Level	Vegetation Condition
Plot 1	-25.8002238	113.713576	Quadrat	3/8/2023	Crest	0-5	N	Red	>50cm	Sand	>3 years	Low	Moderate	Very Good
Plot 2	-25.79952934	113.713161	Quadrat	3/8/2023	Crest	0-5	N	Red	>50cm	Sand	>3 years	Low	Moderate	Very Good
Plot 3	-25.79931234	113.713851	Quadrat	3/8/2023	Crest	0-5	N	Red	>50cm	Sand	>3 years	Low	Moderate	Very Good
Plot 4	-25.80079095	113.713049	Quadrat	3/8/2023	Crest	0-5	N	Red	>50cm	Sand	>3 years	Low	Moderate	Very Good

Site Name	Strata 1 Cover (%)	Strata 2 Cover (%)	Strata 3 Cover (%)	Strata 1 Height (m)	Strata 2 Height (m)	Strata 3 Height (m)	Strata 1 Dominants	Strata 2 Dominants	Strata 3 Dominants
Plot 1		30-70%	<2%		Shrubs >2m	Herbs			*Acacia ramulosa, Acacia tetragonophylla, Persoonia bowgada*
Plot 2		10-30%	<2%		Shrubs >2m	Herbs			*Acacia ramulosa, Acacia tetragonophylla, Persoonia bowgada*
Plot 3		10-30%	<2%		Shrubs >2m	Herbs			*Acacia ramulosa, Acacia tetragonophylla, Persoonia bowgada*
Plot 4		10-30%	<2%		Shrubs >2m	Herbs			*Acacia ramulosa, Acacia tetragonophylla, Persoonia bowgada*

Appendix D

EPBC Protected Matters Search Results

Australian Government

Department of Climate Change, Energy, the Environment and Water

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: 30-Aug-2023

Summary

Details

- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat

Acknowledgements

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:	1
National Heritage Places:	1
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	43
Listed Migratory Species:	59

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/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:	87
Whales and Other Cetaceans:	10
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	1

Extra Information

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

State and Territory Reserves:	7
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	4
Key Ecological Features (Marine):	None
Biologically Important Areas:	8
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Legal Status	Buffer Status
Shark Bay, Western Australia	WA	Declared property	In feature area

National Heritage Places [Resource Information]

Name	State	Legal Status	Buffer Status
Natural			
Shark Bay, Western Australia	WA	Listed place	In feature 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	Buffer Status
BIRD			
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area	In feature 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	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche carteri			
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche cauta			
Shy Albatross [89224]	Endangered	Species or species habitat may occur within area	In buffer area only
Thalassarche impavida			
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris			
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In feature area
FISH			
Thunnus maccoyii			
Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only
MAMMAL			
Bettongia lesueur lesueur			
Burrowing Bettong (Shark Bay), Boodie [66659]	Vulnerable	Translocated population known to occur within area	In buffer area only
Bettongia penicillata ogilbyi			
Woylie [66844]	Endangered	Species or species habitat known to occur within area	In feature area
Dasyurus geoffroii			
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Eubalaena australis			
Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Lagostrophus fasciatus fasciatus			
Banded Hare-wallaby, Merrnine, Marnine, Munning [66664]	Vulnerable	Translocated population known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Macrotis lagotis](#)			
Greater Bilby [282]	Vulnerable	Translocated population known to occur within area	In buffer area only
[Perameles bougainville listed as Perameles bougainville bougainville](#)			
Shark Bay Bandicoot [278]	Endangered	Translocated population known to occur within area	In buffer area only
PLANT			
[Eucalyptus beardiana](#)			
Beard's Mallee [18933]	Vulnerable	Species or species habitat may occur within area	In feature area
REPTILE			
[Aipysurus apraefrontalis](#)			
Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
[Aipysurus foliosquama](#)			
Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
[Caretta caretta](#)			
Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area	In feature area
[Chelonia mydas](#)			
Green Turtle [1765]	Vulnerable	Breeding known to occur within area	In feature area
[Dermochelys coriacea](#)			
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
[Egernia stokesii badia](#)			
Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat known to occur within area	In feature area
[Natator depressus](#)			
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
SHARK			
[Carcharias taurus (west coast population)](#)			
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Carcharodon carcharias			
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Pristis pristis			
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
Rhincodon typus			
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Sphyrna lewini			
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Anous stolidus			
Common Noddy [825]		Species or species habitat likely to occur within area	In buffer area only
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna carneipes			
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area	In feature area
Diomedea amsterdamensis			
Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea exulans			
Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Fregata ariel			
Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In buffer area only
Hydroprogne caspia			
Caspian Tern [808]		Breeding known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Onychoprion anaethetus Bridled Tern [82845]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In buffer area only
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Marine Species			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In buffer area only
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Dugong dugon Dugong [28]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Congregation or aggregation known to occur within area	In buffer area only
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Mobula birostris as Manta birostris			
Giant Manta Ray [90034]		Species or species habitat likely to occur within area	In buffer area only
Natator depressus			
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Orcinus orca			
Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
Pristis pristis			
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
Rhincodon typus			
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Terrestrial Species			
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Arenaria interpres			
Ruddy Turnstone [872]		Roosting known to occur within area	In buffer area only
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris alba			
Sanderling [875]		Roosting known to occur within area	In buffer area only
Calidris canutus			
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area	In feature area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area	In buffer area only
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area	In buffer area only
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area	In buffer area only
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area	In feature area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area	In buffer area only
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area	In buffer area only
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area	In feature area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area	In buffer area only
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area	In feature area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area	In buffer area only
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris alba Sanderling [875]		Roosting known to occur within area	In buffer area only
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area overfly marine area	In buffer area only
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area overfly marine area	In buffer area only
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area overfly marine area	In buffer area only
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area	In buffer area only
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In buffer area only
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area overfly marine area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area overfly marine area	In buffer area only
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area overfly marine area	In buffer area only
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area overfly marine area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area overfly marine area	In buffer area only
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area	In buffer area only
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area	In feature area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In buffer area only
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area overfly marine area	In buffer area only
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area overfly marine area	In buffer area only
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Sternula albifrons as Sterna albifrons Little Tern [82849]		Species or species habitat may occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalasseus bengalensis as Sterna bengalensis Lesser Crested Tern [66546]		Breeding known to occur within area	In buffer area only
Tringa brevipes as Heteroscelus brevipes Grey-tailed Tattler [851]		Roosting known to occur within area	In buffer area only
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area overfly marine area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area overfly marine area	In feature area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area overfly marine area	In buffer area only
Fish			
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area	In buffer area only
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area	In buffer area only
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area	In buffer area only
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area	In buffer area only
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area	In buffer area only
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area	In buffer area only
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area	In buffer area only
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area	In buffer area only
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area	In buffer area only
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area	In buffer area only
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area	In buffer area only
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area	In buffer area only
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area	In buffer area only
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area	In buffer area only
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area	In buffer area only
Mammal			
Dugong dugon Dugong [28]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Reptile			
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Aipysurus foliosquama Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area	In buffer area only
Aipysurus pooleorum Shark Bay Seasnake [66061]		Species or species habitat may occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area	In buffer area only
Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species habitat may occur within area	In buffer area only
Ephalophis greyi North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area	In buffer area only
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area	In buffer area only
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area	In buffer area only

Whales and Other Cetaceans			[Resource Information]
Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area	In buffer area only
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In buffer area only
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Congregation or aggregation known to occur within area	In buffer area only
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area	In buffer area only
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In buffer area only
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In buffer area only

Habitat Critical to the Survival of Marine Turtles			
Scientific Name	Behaviour	Presence	Buffer Status
Nov-Feb			
Caretta caretta Loggerhead Turtle [1763]	Nesting	Known to occur	In buffer area only

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Faure Island	Private Nature Reserve	WA	In buffer area only
Francois Peron	National Park	WA	In buffer area only
Monkey Mia Reserve	5(1)(h) Reserve	WA	In feature area
Nanga Station	NRS Addition - Gazettal in Progress	WA	In buffer area only
Sedimentary Deposits Reserve	5(1)(g) Reserve	WA	In buffer area only
Shark Bay	Marine Park	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Unnamed WA49144	Conservation Park	WA	In buffer area only

Nationally Important Wetlands [Resource Information]

Wetland Name	State	Buffer Status
Shark Bay East	WA	In buffer area only

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Clearing of vegetation for borrow pit and infrastructure areas	2017/7947	Not Controlled Action	Completed	In feature area
Expansion of Monkey Mia Resort	2003/1146	Not Controlled Action	Completed	In feature area
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
Sampling of Stromatolites, additional sites, Mamelin Pool,WA	2013/7071	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only

Biologically Important Areas

Scientific Name	Behaviour	Presence	Buffer Status
Dugong			
Dugong dugon Dugong [28]	Foraging	Known to occur	In buffer area only
Dugong dugon Dugong [28]	Foraging (high density seagrass beds)	Known to occur	In buffer area only
Dugong dugon Dugong [28]	Migration	Known to occur	In buffer area only
Seabirds			
Ardenna pacifica Wedge-tailed Shearwater [84292]	Breeding	Known to occur	In feature area
Sterna dougallii Roseate Tern [817]	Breeding	Known to occur	In buffer area only

Scientific Name	Behaviour	Presence	Buffer Status
[Sternula nereis](#) Fairy Tern [82949]	Breeding	Known to occur	In buffer area only
[Thalasseus bengalensis](#) Lesser Crested Tern [66546]	Breeding	Known to occur	In buffer area only
Whales			
[Megaptera novaeangliae](#) Humpback Whale [38]	Migration (north and south)	Known to occur	In buffer area only

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 E

Definitions of Threatened and Priority Flora and Communities

Conservation Codes for Western Australian Flora and Fauna

Specially protected fauna or flora are species* which have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction, or otherwise in need of special protection, and have been gazetted as such. Conservation codes have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018.*

T Threatened species – Schedules 1-4

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

- **Threatened fauna** is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.
- **Threatened flora** is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species

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 species

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 species

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.

EX Presumed extinct species

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).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW Extinct in the wild species

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.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI Migratory species

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018.*

CD Species of special conservation interest (conservation dependent fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

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.

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.

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.

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.

*Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

Western Australian Ecological Communities

Threatened Ecological Communities

The BC Act provides for the statutory listing of threatened ecological communities (TECs) by the Minister.

Presumed Totally Destroyed (PD)

An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

Critically Endangered (CR)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

Endangered (EN)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

Vulnerable (VU)

An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

Priority Ecological Communities

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community List under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Priority One: Poorly-known ecological communities

Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤ 100ha).

Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Priority Two: Poorly-known ecological communities

Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: Poorly known ecological communities

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:

(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;

(iii) munities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.

(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.

(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category.

(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

Priority Five: Conservation Dependent ecological communities

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Commonwealth of Australia Conservation Codes

Threatened Flora and Fauna

Threatened fauna and flora may be listed under Section 178 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in any one of the following six categories:

Extinct

A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.

Extinct in the wild

A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time:

a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.

Critically endangered

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the five criteria for the category identified in Part 7.01 of the EPBC Regulations, and it is therefore considered to be facing an extremely high risk of extinction in the wild.

Endangered

A taxon is Endangered when the best available evidence indicates that it meets any of the five criteria for the category identified in Part 7.01 of the EPBC Regulations, and it is therefore considered to be facing a very high risk of extinction in the wild.

Vulnerable

A taxon is Vulnerable when the best available evidence indicates that it meets any of the five criteria for the category identified in Part 7.01 of the EPBC Regulations, and it is therefore considered to be facing a high risk of extinction in the wild.

Conservation dependent

A native species is eligible to be included in the conservation dependent category at a particular time if, at that time:

a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or
b) the following subparagraphs are satisfied:
    i. the species is a species of fish;

ii. the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised;
iii. the plan of management is in force under a law of the Commonwealth or of a State or Territory;
iv. cessation of the plan of management would adversely affect the conservation status of the species.

The EPBC Act does not provide for listing in a data deficient category. Where sufficient data (evidence) is unavailable to allow assessment by the Threatened Species Scientific Committee against the criteria for listing, the species are found to be ineligible. A recommendation is made to the Minister to not include the species in any category under the EPBC Act. For reasons of transparency and to inform future research, the Threatened Species Scientific Committee publishes the names of those species found to be data deficient. As data deficient is not a listing category under the EPBC Act, this has no statutory implications and the species is not considered to be listed under the EPBC Act.

Threatened Ecological Communities

Threatened Ecological communities under the EPBC Act are listed in three categories.

Critically endangered

If, at that time, an ecological community is facing an extremely high risk of extinction in the wild in the immediate future (indicative timeframe being the next 10 years).

Endangered

If, at that time, an ecological community is not critically endangered but is facing a very high risk of extinction in the wild in the near future (indicative timeframe being the next 20 years).

Vulnerable

If, at that time, an ecological community is not critically endangered or endangered, but is facing a high risk of extinction in the wild in the medium–term future (indicative timeframe being the next 50 years).

Categories of Threatened Species pursuant to the Environment Protection and Biodiversity Conservation Act 1999

EPBC Act Category	Department of Environment and Energy Definition
Extinct	A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
Extinct in the wild	A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time: (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically endangered	A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	A native species is eligible to be included in the endangered category at a particular time if, at that time (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable	A native species is eligible to be included in the vulnerable category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.
Conservation dependent	A native species is eligible to be included in the conservation dependent category at a particular time if, at that time: (a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

CONSERVATION CATEGORY DEFINITIONS

for Western Australian Ecological Communities

GENERAL DEFINITIONS

An **ecological community** is a naturally occurring assemblage of organisms that occurs in a particular habitat, as defined in the *Biodiversity Conservation Act 2016* (BC Act). Ecological communities may comprise various life forms including plants, animals and microorganisms.

Note: The scale at which ecological communities are defined will often depend on the level of detail in the information source, therefore no particular scale is specified.

A **threatened ecological community** (TEC) means an ecological community that is listed under section 27(1) of the BC Act as a critically endangered, endangered or vulnerable ecological community, or is a rediscovered ecological community to be regarded as a threatened ecological community under section 33 of the BC Act.

An **assemblage** is a defined group of biological entities.

Habitat, as defined in the BC Act, means the biophysical medium or media —

a) occupied (continuously, periodically or occasionally) by an organism or group of organisms, or
b) once occupied (continuously, periodically or occasionally) by an organism, or group of organisms, and into which organisms of that kind have the potential to be reintroduced.

An **occurrence** is a discrete example of an ecological community, separated from other examples of the same community by more than 20 metres with, for example: a different ecological community, a sealed road, a building, a water body (for terrestrial communities), or a terrestrial body (for aquatic communities). There is no minimum size of an occurrence of a threatened or priority ecological community. By ensuring that every discrete occurrence is recognised and recorded, future changes in status can be readily monitored.

Adequately surveyed is defined as an ecological community that has been searched for thoroughly in most likely habitats, by relevant experts.

Community structure is defined as the spatial organisation, construction and arrangement of the biological elements comprising a biological assemblage. For example, the vegetation structure (e.g., *Eucalyptus salmonophloia* woodland over scattered small shrubs over dense herbs) or the trophic structure in a faunal assemblage (e.g., dominance by feeders on detritus as distinct from feeders on live plants).

To **modify** an occurrence of an ecological community, as defined in section 44 of the BC Act, means to take action that results in —

(a) the modification of the occurrence of the threatened ecological community to such an extent that the occurrence is unlikely to recover —
    (i) its species composition or structure; or
    (ii) its species composition and structure; or
(b) the destruction of the occurrence of the threatened ecological community.

Destruction of an occurrence of an ecological community means modification such that reestablishment of ecological processes, species composition or community structure within the range of variability exhibited by the original community is unlikely within the foreseeable future even with positive human intervention.

Modification and destruction are difficult concepts to quantify, and their application will be determined by scientific judgement. Refer to the document Guidance note – Modification of an occurrence of a threatened ecological community for more information on what constitutes modification and how to determine whether an action is likely to modify an occurrence of a threatened ecological community.

Threatening process means a process that threatens, or may threaten, the survival, abundance or evolutionary development of a native species or ecological community, as defined under the BC Act. Examples of some of the continuing threatening processes in Western Australia include: vegetation clearance; competition and land degradation by introduced fauna; dieback caused by the root-rot fungus (*Phytophthora cinnamomi*); competition and displacement of native plants by introduced flora; hydrological changes (declining groundwater levels); drying climate, fire regimes that cause declines in biodiversity; direct human exploitation and disturbance of ecological communities.

Restoration is defined as returning an ecological community to its pre-disturbance or natural state in terms of abiotic conditions, community structure and species composition.

Rehabilitation is defined as the re-establishment of ecological attributes in a damaged ecological community although the community will remain modified.

LISTED ECOLOGICAL COMMUNITIES

Assessment of the conservation status of ecological communities is carried out in accordance with the BC Act listing criteria and the requirements of Ministerial Guideline Number 1 and Ministerial Guideline Number 4 that adopt the use of the International Union for Conservation of Nature (IUCN) Red List of Ecosystems Categories and Criteria.

CO Collapsed ecological communities

An ecological community listed by order of the Minister as collapsed under section 31(1) of the BC Act. As determined by criteria set out in section 32 of the BC Act, an ecological community is eligible for listing as a collapsed ecological community at a particular time if, at that time —

(a) there is no reasonable doubt that the last occurrence of the ecological community has collapsed; or
(b) the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover —
    (i) its species composition or structure; or
    (ii) its species composition and structure.

CR Critically endangered ecological communities

A threatened ecological community listed in the category of critically endangered under section 27(1)(a) of the BC Act, as determined by criteria set out in section 28 of the BC Act and the ministerial guidelines. A critically endangered ecological community faces an extremely high risk of becoming eligible for listing as a collapsed ecological community in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines.

Examples of use:

- ‘Assemblages of the organic springs and mound springs of the Mandora Marsh area’ is listed as a critically endangered threatened ecological community under the *Biodiversity Conservation Act 2016.*
- ‘Assemblages of the organic springs and mound springs of the Mandora Marsh area’ is listed as critically endangered under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table – column heading: BC Act; row text: CR.

EN Endangered ecological communities

A threatened ecological community listed in the category of endangered ecological community under section 27(1)(b) of the BC Act, as determined by criteria set out in section 29 of the BC Act and the ministerial guidelines. A threatened ecological community faces a very high risk of becoming eligible for listing as a collapsed ecological community in the near future, as determined in accordance with criteria set out in the ministerial guidelines.

Examples of use:

- ‘Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson *et al*. (1994))’ is listed as an endangered threatened ecological community under the *Biodiversity Conservation Act 2016.*
- ‘Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))’ is listed as endangered under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table – column heading: BC Act; row text: EN.

VU Vulnerable ecological communities

A threatened ecological community listed in the category of vulnerable ecological community under section 27(1)(c) of the BC Act, as determined by criteria set out in section 30 of the BC Act and the ministerial guidelines. A vulnerable ecological community faces a high risk of becoming eligible for listing as a collapsed ecological community in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines.

Examples of use:

- '*Calothamnus graniticus* subsp. *graniticus* heaths on south west coastal granites' is listed as a vulnerable threatened ecological community under the *Biodiversity Conservation Act 2016.*
- '*Calothamnus graniticus* subsp. *graniticus* heaths on south west coastal granites' is listed as vulnerable under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table – column heading: BC Act; row text: VU.

PRIORITY ECOLOGICAL COMMUNITIES

Priority is not a listing category under the BC Act. The Priority Ecological Communities list is maintained by the department and is published on the department's website.

All fauna and flora that may be present in an ecological community are protected in WA following the provisions in Part 10 of the BC Act. The protection applies even when these species occur in an ecological community that is not listed as threatened, and regardless of land tenure (State managed land (Crown land), private land, or Commonwealth land).

Possible threatened ecological communities that do not meet survey criteria or are not adequately defined to enable listing are added to the department's Priority Ecological Communities for Western Australia list under priority 1, 2 or 3. Ecological communities that are adequately known and not threatened but rare, near threatened, or have recently been removed from the threatened list are placed in priority 4. Conservation dependent ecological communities are placed in priority 5.

P1 Priority 1: Poorly known ecological communities – very few occurrences, very restricted distribution

Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g., within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Examples of use:

- 'Banded Ironstone Hills with *Dryandra arborea*' is listed as a Priority 1 ecological community by the Department of Biodiversity, Conservation and Attractions.
- 'Banded Ironstone Hills with *Dryandra arborea*' is listed as Priority 1 on the DBCA Priority Ecological Communities List.
- Listing reference in a table – column heading: DBCA; row text: P1.

P2 Priority 2: Poorly known ecological communities – few occurrences, restricted distribution

Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Examples of use:

- 'Aquatic invertebrate communities of peat swamps' is listed as a Priority 2 ecological community by the Department of Biodiversity, Conservation and Attractions.
- 'Aquatic invertebrate communities of peat swamps' is listed as Priority 2 on the DBCA Priority Ecological Communities List.
- Listing reference in a table – column heading: DBCA; row text: P2.

P3 Priority 3: Poorly known ecological communities – inadequately surveyed or not well defined

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them. This category includes three sub-categories:

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation.

(ii) Communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years).

(iii) Communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change, etc.

Examples of use:

- 'Assemblages of gypsum dunes of the central and southern wheatbelt' is listed as a Priority 3(iii) ecological community by the Department of Biodiversity, Conservation and Attractions.
- 'Assemblages of gypsum dunes of the central and southern wheatbelt' is listed as Priority 3(iii) on the DBCA Priority Ecological Communities List.
- Listing reference in a table – column heading: DBCA; row text: P3(iii).

P4 Priority 4: Adequately known ecological communities – rare, near threatened, or recently removed from the threatened list

Ecological communities that are adequately known and either rare but not threatened, near threatened, or have recently been removed from the threatened list. These communities require regular monitoring.

(i) Rare: ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.

(ii) Near threatened: ecological communities that are considered to have been adequately surveyed and that do not qualify as conservation dependent, but that are close to qualifying for a higher threat category.

(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

Examples of use:

- 'Nimalaica (Nimalarragun) claypan and associated wetland assemblages' is listed as a Priority 4(ii) ecological community by the Department of Biodiversity, Conservation and Attractions.
- 'Nimalaica (Nimalarragun) claypan and associated wetland assemblages' is listed as Priority 4(ii) on the DBCA Priority Ecological Communities List.
- Listing reference in a table: column heading: DBCA, row text: P4(ii).

P5 Priority 5: Conservation dependent ecological communities

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Categories of Threatened Communities pursuant to the Environment Protection and Biodiversity Conservation Act 1999

Category	Definition
Critically Endangered	(1) An ecological community is eligible to be included in the ***critically endangered*** category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	(2) An ecological community is eligible to be included in the ***endangered*** category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable	(3) An ecological community is eligible to be included in the ***vulnerable*** category at a particular time if, at that time: (a) it is not critically endangered nor endangered; and (b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.