



Onslow Salt Potable Water Treatment Plant Biological Assessment



Biota
Environmental
Sciences



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OSPL NVCP

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1.0 Executive Summary

Onslow Salt plans to clear a small area (up to 0.60 ha) of previously disturbed vegetation to construct a potable water treatment facility to upgrade its current system and improve safety to meet relevant legislative requirements. The proposed site (the survey area) occurs within mining tenement G8SA, and lies approximately 500 m west of the Onslow townsite, in northwest Western Australia.

Biota was commissioned to undertake a biological assessment to identify vegetation, flora and fauna values of the survey area. The objective of the assessment was to act as a preliminary risk assessment of any potential key issues, and to gather biological information to support a Native Vegetation Clearing Permit application. This was achieved through a desktop study of existing information and data, and a field survey by a botanist and zoologist on 26 August 2021.

The desktop study was undertaken to identify features of significance known from the survey area or the broader locality (within 40 km). The review considered regional information, previous biological surveys in the locality, and the results of various database searches. The results of the desktop study were used to assist in the compilation of a list of flora and fauna species of significance potentially occurring in the study area.

During the field survey, a total of 13 native vascular flora species from 12 genera and 8 families were recorded from the survey area, all of which are typical of the locality. This number of species is in the range expected for a survey area of this small size in this location. Four weed species were recorded, **Aerva javanica*, **Cenchrus ciliaris*, **C. setiger* and **Tribulus terrestris*. None of these species are listed as significant under State or Federal legislation. No Threatened flora species were recorded or would be expected to occur. One Priority 3 flora species was recorded, *Abutilon* sp. *Pritzelianum* (S. van Leeuwen 5095). Approximately 35 individuals of this perennial shrub were mapped within a defined section of the survey area (adjacent to the northern boundary) and disturbance to this area should be avoided. No other Priority flora species were considered likely to occur.

No TECs or PECs were recorded in the survey area and none would be expected to occur.

One fauna habitat was recorded for the survey area, *Triodia epactia* very open hummock grassland over **Cenchrus ciliaris*, (**C. setiger*) tussock grassland. This habitat does not represent core habitat for any listed species of significance. Three reptiles were sighted and identified to genus level only, and included two genera of skink (Scincidae) and one dragon (Agamidae). None would represent species of conservation significance.

Database and literature searches yielded a total of 329 vertebrate fauna species with the potential to occur in the survey area, comprising five amphibian species, 69 reptile species including one introduced reptile species, 16 native ground-dwelling mammal species, eight introduced mammal species, 12 bat species and 220 avifauna species. Of these, 94 are significant species, of which 63 have been considered in this report following the exclusion of non-relevant marine-listed and coastal bird species. The database searches returned 104 invertebrate specimens belonging to three groups known to exhibit short-range endemism (land snails, mygalomorph spiders and scorpions). None were of elevated significance.

Following the field survey, 10 species of fauna of significance were ranked as either 'likely to' or 'may occur' in the survey area. However, the small extent of the survey area and the wider distributions of the species suggest it would be unlikely that significant impacts on these species would arise as a result of the clearing, should they be present.

Based on the information available, the proposed clearing is unlikely to be at variance with any of the 10 clearing principles under Schedule 5 of the *Environmental Protection Act 1986*.

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2.0 Introduction

2.1 Background

Onslow Salt plans to clear a small area (up to 0.60 ha) of previously disturbed vegetation to construct a potable water treatment facility to upgrade its current system and improve safety to meet relevant legislative requirements (administered by the Department of Mines, Industry Regulation and Safety and the Department of Health). The proposed site (hereafter referred to as the survey area) occurs within mining tenement G8SA, and lies approximately 500 m west of the Onslow townsite, in northwest Western Australia (WA).

Biota was commissioned to undertake a biological assessment to identify vegetation, flora and fauna values of the survey area.

2.2 Scope of the Study

The objective of the study was to determine if there are any significant flora or fauna species, or vegetation types, that could represent constraints to the development of the survey area or require specific management. This was achieved through a field survey, followed by a desktop study, and preparation of this report to support a Native Vegetation Clearing Permit (NVCP) application.

Specifically, the scope of the study was to:

- review and discuss existing information from the vicinity of the survey area, including literature describing previous surveys completed in the locality, to establish the biogeographical context;
- review and discuss the results of relevant database searches to determine fauna, flora and vegetation communities of significance that may occur in the survey area; specifically Threatened or Priority listed flora or fauna species, and Threatened Ecological Communities (TECs), Priority Ecological Communities (PECs) or other Environmentally Sensitive Areas (ESAs);
- describe, photograph and map the dominant vegetation units occurring within the survey area (including a description of dominant species, structure and vegetation condition, and discussion of their representation in a regional context);
- identify any vegetation units of particular significance within the survey area;
- compile a list of vascular flora species recorded in the survey area;
- record and photograph flora of significance, including Threatened and Priority species and any other species of interest;
- record any introduced flora species (weeds) occurring in the survey area;
- record any opportunistic sightings of fauna whilst conducting flora and vegetation assessments; and
- use the above information to prepare an assessment of the Proposal against the 10 clearing principles, as required for an NVCP application.

The approach and methodology used for the biological field assessment was conducted in accordance with the following:

1. Technical Guidance: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA 2020)¹;
2. Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016c);
3. A guide to the assessment of applications to clear native vegetation under Part V Division 2 of the *Environmental Protection Act 1986* (Department of Environment Regulation 2014); and
4. Technical Guidance: Sampling of Short Range Endemic Invertebrate Fauna (Department of Environment Regulation 2014).

The field survey essentially comprised a “reconnaissance” flora survey and a “basic” fauna survey as per EPA (EPA 2016c, 2020).

¹ EPA (2020) Technical Guidance has recently superseded Technical Guidance: Terrestrial Fauna Surveys (EPA 2016a) and Technical Guidance: Sampling Methods for Terrestrial Vertebrate Fauna (EPA 2016b).

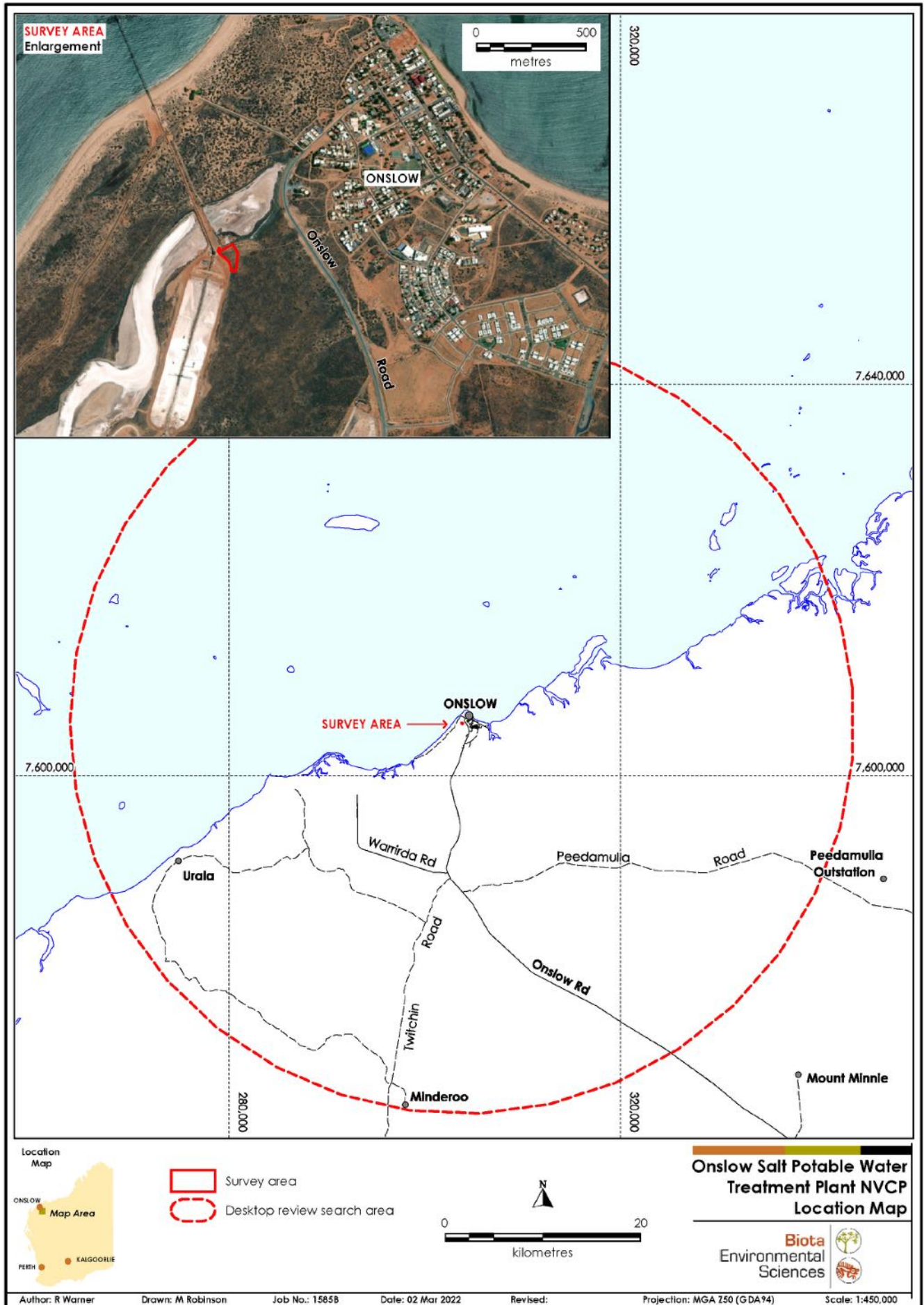


Figure 2.1: Location of the proposed potable water treatment facility.

3.0 Regional Context to the Study

3.1 IBRA Bioregion and Subregion

The Interim Biogeographic Regionalisation of Australia (IBRA7) recognises 89 bioregions for Australia (Department of the Environment and Energy 2019). The survey area lies within the Cape Range subregion of the Carnarvon bioregion (CAR). It is also situated near the western boundary of the Roebourne subregion of the Pilbara bioregion (PIL).

The Cape Range subregion (CAR1) is 2,547,911 ha and is described as:

“Cape Range and Giralia dunefields form the northern part of Carnarvon Basin. Rugged tertiary limestone ranges and extensive areas of red aeolian dunefield, Quaternary coastal beach dunes and mud flats. Acacia shrublands over Triodia on limestone (Acacia stuartii or A. bivenosa) and red dunefields, Triodia hummock grasslands with sparse Eucalyptus trees and shrubs on the Cape Range. Extensive hummock grasslands (Triodia) on the Cape Range and eastern dune-fields. Tidal mudflats of sheltered embayments of Exmouth Gulf support extensive mangroves. Beach dunes with Spinifex communities. An extensive mosaic of saline alluvial plains with samphire and saltbush low shrublands along the eastern hinterland of Exmouth Gulf. Islands of the Muiron, Barrow, Lowendal and Montebello groups are limestone-based. Climate is arid, semi-desert to sub-tropical climate, with variable summer and winter rainfall. Cyclonic activity can be significant, and cyclonic systems may affect the coast and hinterland annually” (Kendrick and Mau 2003).

The Roebourne subregion (PIL4) is 2,008,983 ha and is described as:

“Quaternary alluvial and older colluvial coastal and subcoastal plains with a grass savannah of mixed bunch and hummock grasses, and dwarf shrub steppe of Acacia stellaticeps or A. pyrifolia and A. inaequilatera. Uplands are dominated by Triodia spp. hummock grasslands. Ephemeral drainage lines support Eucalyptus victrix or Corymbia hamersleyana woodlands. Samphire, Sporobolus and mangal occur on marine alluvial flats and river deltas. Resistant linear ranges of basalts occur across the coastal plains, with minor exposures of granite. Islands are either Quaternary sand accumulations, or composed of basalt or limestone, or combinations of any of these three. Climate is arid (semi-desert) tropical with highly variable rainfall, falling mainly in summer. Cyclonic activity is significant, with several systems affecting the coast and hinterland annually” (Kendrick and Stanley 2003).

3.2 Land Systems

Land systems mapping for the survey area has been prepared by Agriculture WA (Payne et al. 1987, 1988, van Vreeswyk et al. 2004). The survey area intersects the Dune land system, as summarised in Table 3.1. The Dune land system is widespread in the locality.

Table 3.1 Land systems intersected by the survey area.
(Data from Payne et al. 1987, 1988, van Vreeswyk et al. 2004).

Land System	Description	Total Area of Land System in the Cape Range and Roebourne Subregions (ha)	Area of Land System in the Survey area (ha)	Percentage of Total Land System that Occurs in the Survey area (%)
Dune (RGEDUN)	Dune fields supporting soft spinifex grasslands	43,986.6	0.6	1.4 x10 ⁻⁵

3.3 Geology and Soils

The survey area is situated on the fringe of a long lacustrine flat engulfed by coastal dunes and lies approximately 750 m from the coast. Surface geology was mapped at a scale of 1:250,000 by the Geological Survey of Western Australia and Geoscience Australia (2008), (Table 3.2, Figure 3.1).

One soil unit, SV8, was mapped at a scale of 1:2,000,000 for the survey area by Agriculture Western Australia (1967), (Table 3.2 and Figure 3.1).

Table 3.2: Geological and soil units occurring within the survey area.

	Unit	Description	Extent within Survey area (ha)
Geology	Qt	Lacustrine or residual mud, clay, silt and sand, commonly gypsiferous and/or saline; playa, claypan, and swamp deposits; peat; peaty sand and clay; halitic and gypsiferous evaporites	0.56
	Qdc	Beach sand, sand dunes, coastal dunes, beaches, and beach ridges; calcareous and siliceous, locally shelly and/or cemented (beach rock); locally reworked	0.04
Soils	SV8	Salt flats, tidal swamps, and coastal dune sands: chief soils are saline loams (Um1.3) and (Um1.4) with shelly sands (Uc1.11, Uc1.13). Small areas of calcareous earths (Gc) and shallow loams (Um) are associated with marls.	0.60

3.4 Beard's Vegetation Units

Beard (1975a, 1975b) described and mapped the vegetation of the Pilbara and northern Carnarvon bioregion at a scale of 1:1,000,000. The survey area intersects one unit mapped over the Cape Yanner Coastal Plain (CYCP) by Beard (Table 3.3):

- CYCP 117: Hummock grasslands, grass steppe; soft spinifex.

This vegetation unit is widespread in the Cape Range subregion and has been subject to clearing. However, given the broad scale of Beard's mapping, these units provide only limited information about the vegetation occurring in the survey area (see Section 6.1 for a more detailed description of the vegetation).

Table 3.3: Beard's vegetation mapping units occurring in the survey area and their pre-European and current extent in the Cape Range and Roebourne subregions combined.

Beard's Vegetation Mapping Unit	Extent within Cape Range and Roebourne Subregions (ha)		Percent Remaining	Extent within the Survey area (ha) (% of Current Mapped Extent in the Cape Range and Roebourne Subregions)
	Pre-European	Current		
CYCP 117	63,387.3	57,809.6	91.2%	0.6 (1.04 x 10 ⁻⁵)

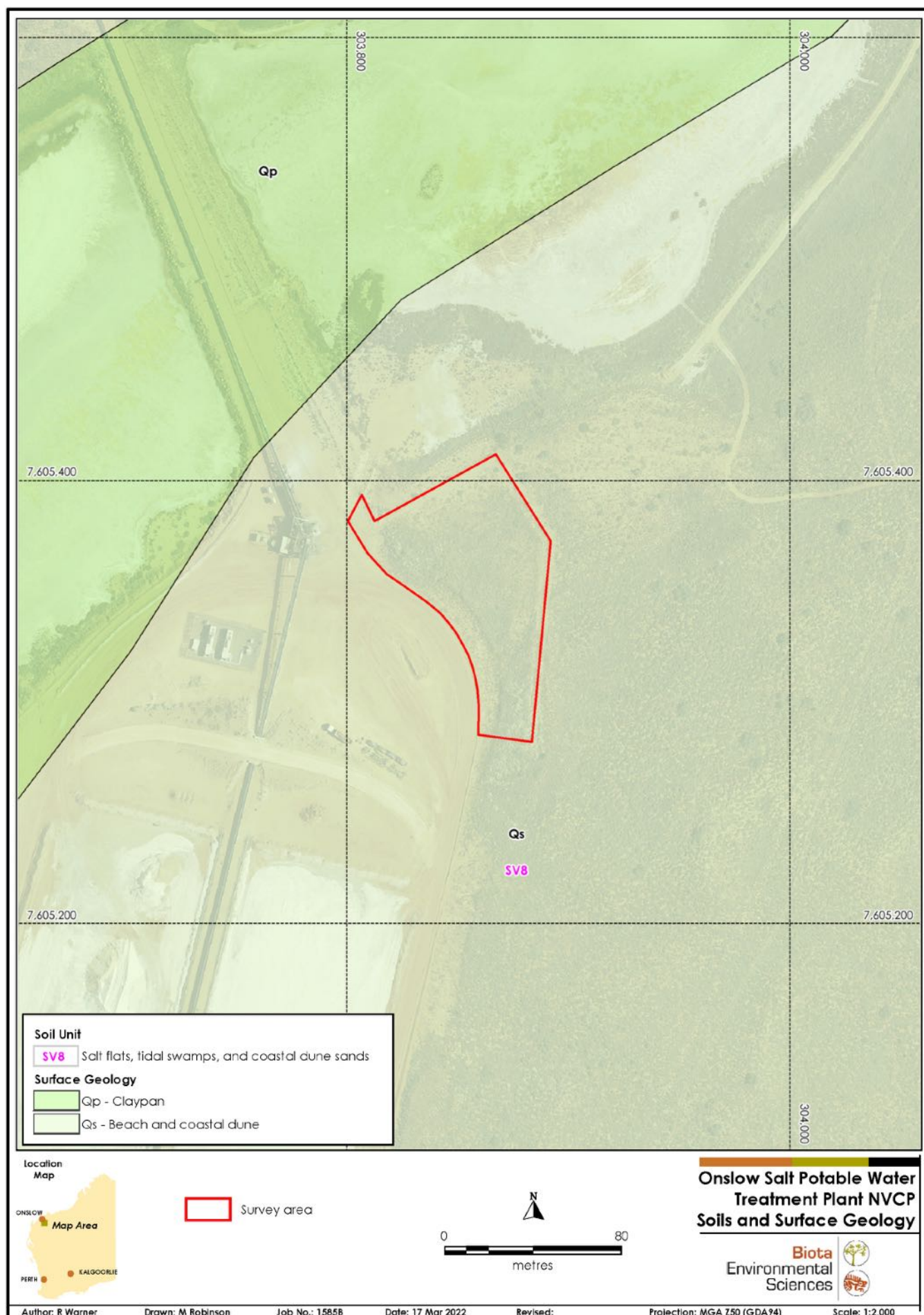


Figure 3.1: Geological and soil units occurring within the survey area and surrounds.

3.5 Conservation Reserves and Protected Areas in the Locality

Fifteen lands of conservation significance lie within 40 km of the survey area, including three places listed on the Register of the National Estate (RNE) and 10 Department of Biodiversity, Conservation and Attractions (DBCA) managed lands and lands of interest (Figure 3.2).

The Old Onslow Townsite is listed on both the National and State Register of Heritage Places and is located 12 km southwest of the survey area. The Exmouth Gulf to Cape Preston Coastal Margin is included on the RNE and occupies the vast majority of the coastal margin within the locality, including the survey area. The Islands of Exmouth Gulf and Rowley Shelf are also listed on the RNE and are scattered throughout the offshore section of the locality, measuring 13 km from the survey area at the closest point, but are not of relevance to the survey area.

Twelve DBCA managed lands and lands of interest occur within 40 km of the survey area, however none are in close proximity (within 20 km). These include Airlie Island Nature Reserve, Bessieres Island Nature Reserve (Class A), Cane River Conservation Park, Little Rocky Island Nature Reserve (Class A), Locker Island Nature Reserve (Class A), Thevenard Island Nature Reserve and two unnamed reserves.

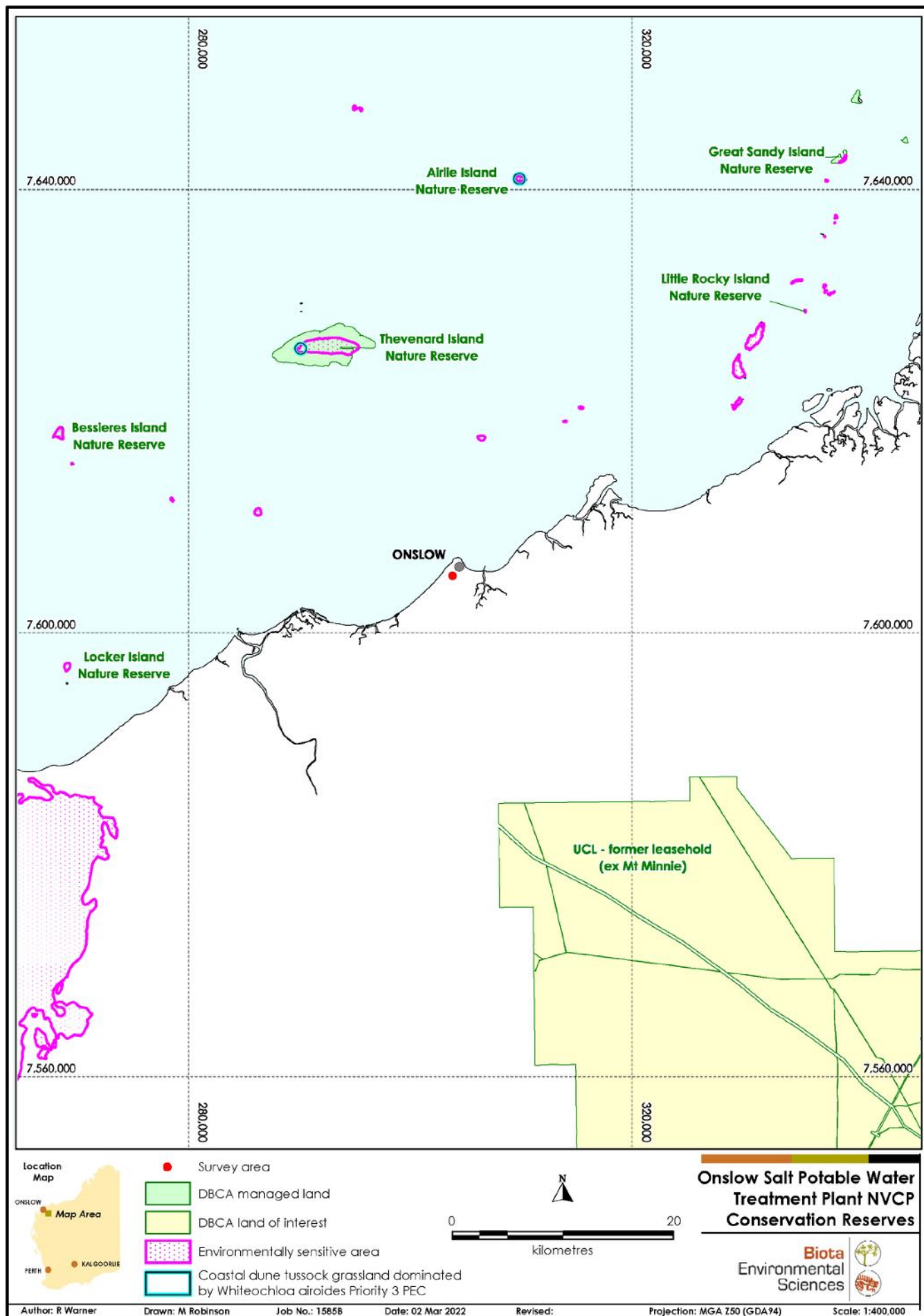


Figure 3.2: Conservation reserves in the vicinity of the survey area.

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4.0 Methodology

To meet the objectives of this biological assessment a desktop study was undertaken (Section 4.1) along with a field survey (Section 4.3).

4.1 Desktop Study

The desktop study was undertaken to identify features of significance known from the survey area or the broader locality (within 40 km). Appendix 1 contains more information regarding the framework for conservation significance ranking of communities and species in WA. The desktop study was also used to assess the level of biological survey work that had been completed previously in the survey area.

The review considered regional information, previous biological surveys in the locality, and the results of various database searches (see Appendix 2), as discussed in the following sections. The results of the desktop study were used to assist in the compilation of a list of flora species of significance potentially occurring in the survey area (Appendix 3), as well as lists of fauna, including species of significance, potentially occurring in the survey area (Appendix 4).

4.1.1 Database Searches

The following databases were searched for records of fauna, flora and vegetation of significance previously recorded from the survey area, or known to occur in the locality²:

1. The DBCA databases of TECs and PECs, Declared Rare and Priority Flora, and Threatened Fauna. These data searches requested the return of records from a 40 km buffer around the survey area boundary. The databases were queried on 01/02/2022 but results are not appended here, consistent with normal DBCA data management expectations.
2. The Atlas of Living Australia (ALA) (<http://www.ala.org.au>): a joint project between academic collecting institutions, private individual collectors and community groups. The atlas contains occurrence records, environmental data, images and the conservation status of species throughout Australia. The database search requested the return of fauna records from a 40 km buffer around the survey area boundary and was conducted on 01/02/2022 (see Appendix 4).
3. The Commonwealth EPBC Act Protected Matters Search Tool. The database search requested the return of records within a 40 km buffer around the survey area boundary (Appendix 2). The database was searched on 01/02/2022.
4. eBird (<https://ebird.org/>) - A citizen science database for bird records run by the Cornell Lab of Ornithology. This database was searched for supplementary records of conservation significant bird species within 40 km of the survey area. The database was searched on 02/03/2022.
5. Biota's internal flora and fauna databases. The search was within 40 km of the survey area and was conducted on 02/03/2022.

4.2 Assessment of Likelihood of Occurrence in the Survey Area

In order to determine which species of conservation significance had the potential to occur in the survey area, the results of the database searches and previous surveys in the locality were examined while considering the known habitat preferences for the species. Habitats were defined prior to the field survey according to the landforms apparent on aerial imagery, and

² The search areas for each database included coastal and marine areas. Mammal and reptile species inhabiting these areas were excluded from consideration. Avifauna species inhabiting marine/coastal areas have been included in the potential species list for completeness, but are excluded from the likelihood of occurrence assessment. Erroneous records of species returned from the database searches (i.e. those that were outside of known ranges or would not occur in Australia) were also excluded.

taking into account existing information regarding the environment and results from previous surveys (Section 5.1).

The likelihood that flora and fauna species of conservation significance would occur in the survey area was then assessed as part of the desktop review using a set of rankings and criteria (Table 4.1). These rankings were subsequently revised as necessary following the field survey (see Appendices 3 and 4). Through the remainder of this report, the term “close proximity” has been defined as being within 20 km of the survey area, while the broader “locality” comprises the area up to 40 km (Pilbara) from the survey area.

Table 4.1: Ranking system used to assign the likelihood that a species would occur in the survey area.

Rank	Criteria
Recorded	1. The species has been recorded in the survey area previously, or was recorded in this study.
Likely to occur	1. There are existing records of the species in close proximity to the survey area; and <ul style="list-style-type: none"> the species is strongly linked to a specific habitat, which is present in the survey area; or the species has more general habitat preferences, and suitable habitat is present.
May occur	1. There are existing records of the species from the locality, however <ul style="list-style-type: none"> the species is strongly linked to a specific habitat, of which only a small amount is present in the survey area; or the species has more general habitat preferences, but only some suitable habitat is present in the survey area. 2. There is suitable habitat in the survey area, but the species is recorded infrequently in the locality.
Unlikely to occur	1. The species is linked to a specific habitat, which is absent from the survey area; or 2. Suitable habitat is present, however there are no existing records of the species from the locality despite reasonable previous search effort in suitable habitat; or 3. There is some suitable habitat in the survey area, however the species is very infrequently recorded in the locality, or the only records are historical (>40 years ago).
Would not occur	1. The species is strongly linked to a specific habitat, which is absent from the survey area; and/or 2. The species' range is very restricted and would not include the survey area.

Two rankings have been provided:

1. An initial assessment was made during the desktop study (see Appendices 3 and 4). This was based on consideration of the overall distribution of the species, the proximity of the survey area to known populations, the reliability and age of any historic records, and, if the species was known to be linked to particular habitats, whether suitable habitat appeared to be present in the survey area based on inspection of aerial photography and/or existing information.
2. The likelihood rankings were subsequently revised as necessary based on the findings of the field survey (see Appendices 3 and 4). Where the initial and final likelihood rankings were different, the reason was provided.

4.3 Field Survey

4.3.1 Survey Team

The field survey was undertaken on 26 August 2021 by Rachel Warner and Michael Greenham. Table 4.2 summarises their qualifications.

Table 4.2: Summary of personnel qualifications.

Name	Position at Biota	Qualification	Years of Experience	Survey Role	Licence Number
Rachel Warner	Principal Environmental Scientist / Botany Manager	BSc (Hons)	16	Botanist	FB62000036
Michael Greenham	Senior Zoologist	BSc	22	Zoologist	NA

4.3.2 Survey Timing and Conditions

Preceding weather conditions (particularly rainfall) influence the number and suite of flora species that are recorded. Rainfall data were compiled from Onslow Salt's (OSPL) monitoring station data and the Bureau of Meteorology (BoM) weather recording station at Onslow Airport (station number 5017), as shown in Figure 4.1. In the six months prior to the survey, rainfall totaled 252.3 mm, which is 2.8 times higher than the long-term median of 91.7 mm (Bureau of Meteorology 2021). Between the months of February and June, rainfall was consistently high, ranging from 30.8 mm in June to 92.0 mm in March. Conditions were considered good for the collection of annual flora during the survey.

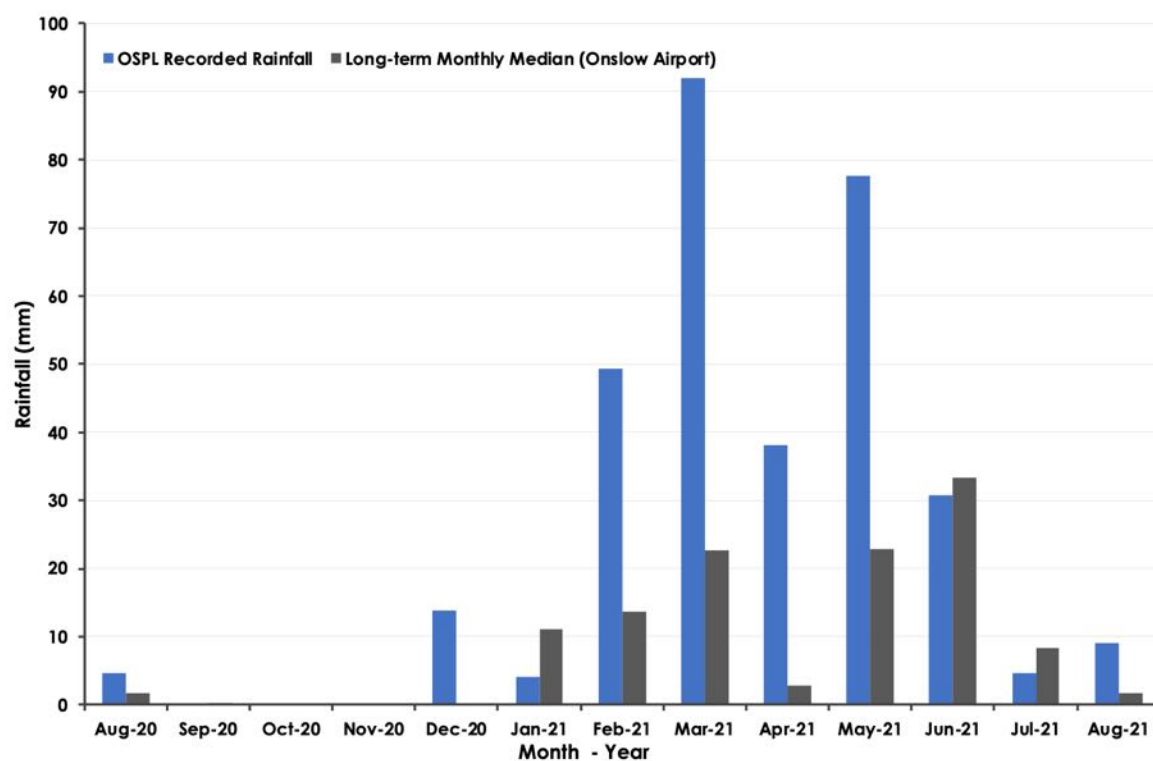


Figure 4.1: Total monthly rainfall for the OSPL recording station for August 2020 to August 2021, compared to the long-term monthly median rainfall for the BoM Onslow Airport station (1916-2021).

4.3.3 Floristic Data Collection

One unbounded floristic sampling site, a relev  , was established within the survey area (approximately 50 m x 50 m in size) and thoroughly surveyed. Given the small size of the survey area, the relev   effectively covered the entire area. The following parameters were recorded:

1. Location: a central MGA coordinate was recorded in WGS84 datum using a hand-held Global Positioning System (GPS) unit;
2. Habitat: A description of the landform and habitat;
3. Flora Species: The estimated percentage foliar cover of each flora species present within the vicinity of the relev   (within a ~30 m radius of the centre point); and
4. Vegetation Description: A broad description based on the height and estimated cover of dominant species after Aplin's (1979) modification of the vegetation classification system of Specht (1970) (see Appendix 5);
5. Fire History: An estimate of time since last fire;
6. Soil: A broad description of the soil surface and stony surface mantle;
7. Disturbance Details: Vegetation condition was ranked according to the scale from EPA (2016c), which was based on that developed by Trudgen (1988), considering evidence of grazing, physical disturbance, weed invasion etc. (see Appendix 5); and
8. Photograph: A representative digital photograph of the vegetation was taken.

4.3.4 Vegetation Description, Condition Assessment and Mapping

The vegetation unit for this study was described at the sub-association level (level VI as per the National Vegetation Information System; NVIS)³, which is the most detailed level under the NVIS. This level of detail would be considered fine-scale (intra-locality) delineation of vegetation units as per EPA (2016c).

The vegetation condition assessment was based on the ranking scale developed by Trudgen (1988) (see Appendix 5). The rankings include degree of invasion by introduced flora (weeds), impact from humans, feral animals and livestock activities, and the structural integrity of the vegetation.

Vegetation maps were created and consolidated using Geographical Information System (GIS) software (QGIS and MapInfo Professional), and locations of significant flora were added. All maps in this report were produced by Melissa Robinson (GIS Cartographer at Biota) using MapInfo Professional (version 11).

4.3.5 Searches for Conservation Significant Flora and Weeds

Targeted searches for significant species were conducted on foot through the entire survey area.

Locations of species of significance, introduced flora species and/or unknown taxa were recorded using a handheld GPS unit (WGS84 datum). The number of individuals and extent of the population were also recorded, along with the habitat and associated species.

4.3.6 Fauna Habitat Assessment and Sampling

Non-systematic methods were employed to search for fauna, or secondary evidence thereof, during foot traverses of the survey area. The aim was to locate, describe and search habitats that may support fauna of significance, habitat-specific species and other species of interest with the potential to occur based on the results of the desktop study. A range of non-systematic techniques were used, including:

³ <http://www.environment.gov.au/erin/nvis/publications/avam/section-2-1.htm>

- foot traverses to record evidence of terrestrial vertebrate species of significance;
- identification and recording of secondary signs including tracks, scats and diggings; and
- recording of opportunistic sightings and calls.

4.4 Flora Specimen Identification, Nomenclature and Data Entry

Common species that were well known to the survey botanist were confirmed in the field. A voucher specimen was collected if the specimen was either difficult to determine without closer examination, belonged to a recognised species complex, was poorly collected or otherwise unusual, or was in very good condition (healthy specimens with flowers and/or fruits are often useful to submit to the WA Herbarium).

Voucher specimens were identified using flora keys, consulting appropriate publications and checking reference collections. Biota botanists identified all specimens which were then checked by Specialist Taxonomist Louis de Kock of dK Botanical.

A flora species list is provided in Appendix 6. Nomenclature and conservation significance rankings used in this report are consistent with the current listing of WA flora recognised by the WA Herbarium on FloraBase at the time of preparation of this report.

4.5 Limitations

As per the EPA's *Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016c) and *Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA 2020), potential constraints or limitations for this study are addressed in Table 4.3.

Table 4.3: Potential constraints and limitations of the Onslow Salt Potable Water Treatment Plant biological assessment.

Potential Constraint	Statement of Limitations
1. Sources of information	<ul style="list-style-type: none"> • The broader Onslow locality has been well surveyed, with several past reports publicly available to be considered as part of the desktop study. Additionally, publicly available databases of rare species and community information were searched, as was the Biota internal database. Regional and local level information is not considered to be a limiting factor for this study.
2. Survey scope	<ul style="list-style-type: none"> • The survey objective was to provide the necessary information required to support an NVCP application. Given the small size of the survey area and the scale of the proposed clearing, a desktop study and a reconnaissance flora and basic fauna survey as per EPA (2016c, 2020) was considered appropriate, with some targeted sampling also conducted. • No systematic trapping for fauna was performed. This is consistent with a basic fauna survey (EPA 2020).
3. Proportion of flora / fauna collected and identified	<ul style="list-style-type: none"> • All vascular flora encountered in the survey area were recorded. A total of 14 vascular flora species from 8 families were recorded during the current survey. • The basic fauna survey focused on recording significant species from secondary evidence, and did not attempt to record all species (this would require systematic trapping as part of a detailed survey).
4. Completeness of survey	<ul style="list-style-type: none"> • The survey area was surveyed to a satisfactory level to support an NVCP application. As for any study, additional survey effort would lead to additional species being recorded.
5. Mapping reliability	<ul style="list-style-type: none"> • Vegetation units and fauna habitats were described and mapped based on data collected during systematic and targeted foot traverses throughout the survey area. • The mapping is considered to provide a reliable indication of the vegetation units and fauna habitats in the survey area.

Potential Constraint	Statement of Limitations
6. Timing, weather, season, cycle	<ul style="list-style-type: none"> The survey intensity was adequate for recording the annual, ephemeral and cryptic perennial flora present at the time, and the list of vascular flora documented from the survey area is comprehensive for an area of this size (0.6 ha). The survey was conducted at the start of the dry season, however preceding conditions were good for the collection of most flora species (above average rainfall was recorded).
7. Disturbances	<ul style="list-style-type: none"> There were no disruptions during the survey and it was undertaken as planned.
8. Intensity of survey	<ul style="list-style-type: none"> A reconnaissance/basic survey with targeted sampling was considered adequate to address the requirements for an NVCP application.
9. Resources and experience levels	<ul style="list-style-type: none"> Due to the very small size of the survey area, only 1.5 hours was required to complete a thorough survey. The botanist and zoologist undertaking the survey were suitably qualified and experienced to identify flora and fauna respectively. There were therefore no limitations due to resourcing.
10. Access issues	<ul style="list-style-type: none"> The entirety of the survey area could be accessed and surveyed at an appropriate level. There were therefore no limitations due to access issues.

It should also be noted that in relation to vertebrate fauna, only terrestrial fauna species were included in the vertebrate potential species list; species of marine mammals and reptiles were omitted. Birds that rely upon marine, wetland or coastal habitats, including seabirds, shorebirds and waterbirds, were included in the potential species list for completeness due to the proximity of marine and coastal habitats to the study area, but were excluded from the likelihood of occurrence assessment (Appendix 4).

5.0 Desktop Study Results

5.1 Previous Surveys in Locality

5.1.1 Previous Flora Surveys

Several major surveys completed within 40 km of the present survey area were reviewed, with a focus on identifying records of TECs, PECs, and flora species of conservation significance known from the locality. The findings from the most relevant surveys are summarised in Table 5.1.

For all of the surveys, it was recognised that these comprised “snap-shot” assessments of the flora at a particular time, and that further species would be recorded with additional survey work; the species lists should therefore be taken as indicative rather than exhaustive. Any other key limitations mentioned in the reports that are relevant to their current use are listed in Table 5.1.

5.1.2 Previous Fauna Surveys

Fauna surveys targeting both vertebrate fauna and SRE invertebrate fauna relevant to this study, conducted within the locality (40 km) of the study area since 2004 are summarised in Table 5.1.

Table 5.1: Summary of the major flora and vegetation surveys completed within 40 km of the survey area.

Project/Survey (Reference)	Survey Type: Date	Size of Area (ha)	No. of Native Taxa	Features of Conservation Significance / TECs and PECs / Threatened and Priority Species	Stated Limitations Relevant to the Current Use of this Survey
Onslow Solar Saltfield Annual Environmental Report (Biota 2018)	Annual Environmental Report: August 2018	23,626	Not applicable	<ul style="list-style-type: none"> • No TECs. • No PECs. • No Threatened flora. • One Priority 3 flora species: <i>Stackhousia clementii</i> 	<ul style="list-style-type: none"> • None stated.
Onslow Solar Saltfield Annual Environmental Report (Biota 2021a)	Annual Environmental Report: August 2021	23,626	Not applicable	<ul style="list-style-type: none"> • No TECs. • No PECs. • No Threatened flora. • One Priority 3 flora species: <i>Abutilon</i> sp. Pritzelianum (S. van Leeuwen 5095) 	<ul style="list-style-type: none"> • None stated.
Wheatstone Rare Flora Survey (Biota 2011)	Rare flora searches: March 2011	Greater Onslow locality.	Not applicable	<ul style="list-style-type: none"> • No TECs. • No PECs. • No Threatened flora. • One Priority 1 flora species: <i>Abutilon</i> sp. Onslow (F. Smith s.n. 10/9/61). • Three Priority 3 flora species: <i>Eleocharis papillosa</i>, <i>Eremophila forrestii</i> subsp. <i>viridis</i>, <i>Triumfetta echinata</i>. 	<ul style="list-style-type: none"> • The timing of the survey was not suitable to collect flowering or fruiting material of the perennial target species.
A Vegetation and Flora Survey of the Wheatstone Study Area near Onslow (Biota 2010a)	Flora and vegetation survey: March & April 2009	9,794	<ul style="list-style-type: none"> • 418 taxa • 162 genera • 58 families 	<ul style="list-style-type: none"> • No TECs. • No PECs. • Vegetation considered to be of high conservation significance: Inland linear sand dunes (units ID1, ID2), and Mangal vegetation (unit T2). • No Threatened flora. • One Priority 1 flora species: <i>Abutilon</i> sp. Onslow (F. Smith s.n. 10/9/61). • Four Priority 3 flora species: <i>Atriplex flabelliformis</i>, <i>Eleocharis papillosa</i>, <i>Eremophila forrestii</i> subsp. <i>viridis</i>, <i>Triumfetta echinata</i>. 	<ul style="list-style-type: none"> • Although the timing of the 2009 surveys was appropriate to detect most annual flora species, groups such as the daisies (family Asteraceae), which germinate mainly after winter rainfall are under-represented on the vascular flora list. • The record of <i>Atriplex flabelliformis</i> was based on an unvouchered record from Astron (2008), and was considered questionable.

Project/Survey (Reference)	Survey Type: Date	Size of Area (ha)	No. of Native Taxa	Features of Conservation Significance / TECs and PECs / Threatened and Priority Species	Stated Limitations Relevant to the Current Use of this Survey
Wheatstone Project Flora and Fauna Assessment Addendum (Biota 2010b)	Desktop assessment: May 2010	Five areas, totalling 2,772	<ul style="list-style-type: none"> • 422 taxa • 161 genera • 58 families 	<ul style="list-style-type: none"> • No TECs. • No PECs. • No Threatened flora. • Four Priority 3 flora species: <i>Atriplex flabelliformis</i>, <i>Eleocharis papillosa</i>, <i>Eremophila forrestii</i> subsp. <i>viridis</i>, <i>Triumfetta echinata</i>. 	<ul style="list-style-type: none"> • The record of <i>Atriplex flabelliformis</i> was based on an unvouchered record from Astron (2008), and was considered questionable.
Onslow Strategic Industrial Area Flora Survey (Biota 2006)	Flora and vegetation survey: October 2005	~500	<ul style="list-style-type: none"> • 158 taxa • 95 genera • 41 families 	<ul style="list-style-type: none"> • No TECs. • No PECs. • No Threatened flora. • No Priority flora. 	<ul style="list-style-type: none"> • Some sections of the project area were not accessible by vehicle, and could only be reached on foot. • As only a portion of the project area could be systematically sampled, not all of the variation in the vegetation, nor all of the flora species, would have been identified.
BHP Billiton Pilbara LNG Project: Flora and Vegetation Study (Biota 2005)	Flora and vegetation survey: June 2005	490	<ul style="list-style-type: none"> • 158 taxa • 95 genera • 41 families 	<ul style="list-style-type: none"> • No TECs. • No PECs. • No Threatened flora. • No Priority flora. 	<ul style="list-style-type: none"> • Some sections of the project area were not accessible by vehicle, and could only be reached on foot. • As only a portion of the project area could be systematically sampled, not all of the variation in the vegetation, nor all of the flora species, would have been identified.
A Vegetation and Flora Survey of Additional Infrastructure Areas of the Proposed BHP Billiton Pilbara LNG Project (Biota 2007)	Flora and vegetation survey: August 2006	1,305	<ul style="list-style-type: none"> • 242 taxa • 140 genera • 47 families 	<ul style="list-style-type: none"> • No TECs. • No PECs. • Vegetation considered being regionally and locally significant: samphire shrublands of saline flats (units SF.1, SF.2, SF.3, and SF.4), and ephemeral bare claypans (unit BCp). • No Threatened flora. • No Priority flora. 	<ul style="list-style-type: none"> • Some sections of the project area were not accessible by vehicle, and could only be reached on foot. An area south of a main tributary of Beadon Creek could not be accessed on foot or by vehicle, as there are no crossings of the creek in this area.
Ashburton Salt Project Flora and Vegetation Survey (Biota 2020a)	Flora and vegetation survey: 2019	60,104	<ul style="list-style-type: none"> • 288 taxa • 126 genera • 45 families 	<ul style="list-style-type: none"> • No TECs. • No PECs. • One Priority 1 species: <i>Minuria tridens</i> • Three Priority 3 species: <i>Abutilon</i> sp., <i>Pritzelianum</i> (S. van Leeuwen 5095), <i>Eremophila forrestii</i> subsp. <i>viridis</i>, <i>Stackhousia clementii</i>, <i>Triumfetta echinata</i>. 	<ul style="list-style-type: none"> • None stated.

Project/Survey (Reference)	Survey Type: Date	Size of Area (ha)	No. of Native Taxa	Features of Conservation Significance / TECs and PECs / Threatened and Priority Species	Stated Limitations Relevant to the Current Use of this Survey
Onslow Desalination Plant and Pipeline Fauna and Flora Survey (Biota 2020b)	Flora and vegetation survey	35	<ul style="list-style-type: none"> • 73 taxa • 53 genera • 25 families 	<ul style="list-style-type: none"> • No TECs. • No PECs. • Vegetation considered being locally significant: samphire shrublands (unit T1). 	<ul style="list-style-type: none"> • None stated.
Macedon Gas Pipeline Rehabilitation Survey (Biota 2017, 2019, 2021b)	Flora monitoring: 2017, 2019, 2021	690	<ul style="list-style-type: none"> • 253 taxa • 108 genera • 38 families 	<ul style="list-style-type: none"> • One Priority 1 flora species: <i>Abutilon</i> sp. Onslow (F. Smith s.n. 10/9/61). 	<ul style="list-style-type: none"> • Fire disturbance at some transects

Table 5.2: Summary of previous fauna surveys conducted within 40 km of the survey area.

Report (Author)	Survey Type: Date	Size of Area (ha)	Taxonomic Groups Documented	Survey Methods	Significant Findings	Stated Limitations Relevant to the Current Use of this Survey
West Pilbara Iron Ore Project Onslow Rail Corridor Terrestrial Fauna Survey (Biota 2009)	Level 2 single-phase survey: 2008	100,651	<ul style="list-style-type: none"> • Terrestrial avifauna • Mammals • Bats • Reptiles • Amphibians • SRE Invertebrates 	<ul style="list-style-type: none"> • Pitfall trapping • Elliott trapping • Systematic bird sampling • Echolocation call recording • Burrow searching • Nocturnal spotlighting • Recording secondary sign • Opportunistic sightings 	<ul style="list-style-type: none"> • Northern Quoll (<i>Dasyurus hallucatus</i>; EN) • Australian Bustard (<i>Ardeotis australis</i>; P4) 	<ul style="list-style-type: none"> • Single phase survey only
Wheatstone Project Terrestrial Fauna Survey (Biota 2010c)	Level 2 single-phase survey: 2009	9,824	<ul style="list-style-type: none"> • Terrestrial avifauna • Mammals • Bats • Reptiles • Amphibians • SRE Invertebrates 	<ul style="list-style-type: none"> • Pitfall trapping • Funnel trapping • Elliott trapping • Recording secondary sign • Opportunistic records 	<ul style="list-style-type: none"> • Two mammal species of conservation significance • Four avifauna species of conservation significance 	<ul style="list-style-type: none"> • Not all areas were ground-truthed or equally sampled for fauna • Single phase survey only
Ashburton Salt Project Level 2 Seasonal Fauna Survey (Biota 2020c)	Level 2 two-phase survey: 2018-2019	60,104	<ul style="list-style-type: none"> • Terrestrial avifauna • Mammals • Bats • Reptiles • Amphibians • SRE Invertebrates 	<ul style="list-style-type: none"> • Pitfall trapping • Elliott trapping • Funnel Trapping • Systematic and opportunistic bird searches • Remote camera trapping • Echolocation call recording • Habitat-specific searches • Recording secondary sign • Opportunistic sightings • SRE fauna searches 	<ul style="list-style-type: none"> • 12 avifauna species of conservation significance • One bat species of conservation significance 	<ul style="list-style-type: none"> • Not all areas were ground truthed or systematically sampled

5.2 Vegetation and Flora

5.2.1 Threatened and Priority Ecological Communities

TECs are described by DBCA as biological assemblages occurring in a particular habitat, which are under threat of modification or destruction from various processes (as per DEC 2010; see Appendix 1). TECs are listed by the WA Minister for Environment and are significant at the State level, being protected as ESAs under the *WA Environmental Protection Act 1986*. No TECs are known to occur within 40 km of the survey area.

PECs are defined as possible TECs that do not meet survey criteria or that are not adequately defined. These communities are added to the PEC List under priorities 1, 2 and 3 (DBCA 2013). One occurrence of one PEC was identified by a search of the DBCA database as occurring within 40 km of the survey area. This PEC is described below:

Coastal dune native tussock grassland dominated by *Whiteochloa airoides* – Priority 3

Tussock grassland of *Whiteochloa airoides* occurs on the landward side of foredunes, hind dunes or remnant dunes with white or pinkish white medium sands with marine fragments. There may be occasional *Spinifex longifolius* tussock or *Triodia epactia* hummock grasses and scattered low shrubs of *Olearia* sp. Kennedy Range (G. Byrne 66), *Scaevola spinescens*, *S. cunninghamii*, *Trianthema turgidifolium* and *Corchorus* species (*C. walcottii*, *C. laniflorus*). Occurs on Barrow Island, Tent Island and possibly some unaffected littoral areas in west Pilbara. Threats include weed invasion (**Cenchrus ciliaris*, **Aerva javanica*), altered fire regimes, grazing, basic raw material extraction" (DBCA 2019).

This PEC occurs in closest proximity on the western coast of Thevenard Island, approximately 26 km northwest of the survey area, as well as on Airlie Island. Both occurrences of this PEC are restricted in their distribution and would not occur within the survey area.

5.2.2 Threatened and Priority Flora

Based on the desktop study, no Threatened species have been recorded from the locality, and none would be expected to occur in the survey area.

An occurrence of the Priority 3 *Corynotheca flexuosissima* recorded 2 km northeast of the survey area was deemed to be an erroneous record as it was labelled as being collected on Serrurier Island, which is 45 km west of the survey area.

A total of eight priority listed species have been recorded within 40 km of the survey area (see Figure 5.1), comprising one Priority 1 species and seven Priority 3 species. Their likelihood rankings are summarised below (see also Appendix 3):

- one species was considered 'likely to occur', *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095);
- four species were ranked as 'may occur' (*Abutilon* sp. Onslow (F. Smith s.n. 10/9/61) (P1), *Eremophila forrestii* subsp. *viridis*, *Stackhousia clementii* and *Triumfetta echinatum*);
- two were considered 'unlikely to occur', *Corynotheca flexuosissima* and *Eleocharis papillosa*; and
- one 'would not occur', *Carpobrotus* sp. Thevenard Island (M. White 050).

5.2.3 Significant Weed Species

Although databases were not searched for weed species as part of the desktop study, given the location of the survey area near a settlement, it is possible that introduced flora listed as Declared Pests or Weeds of National Significance (WONS) may be present.

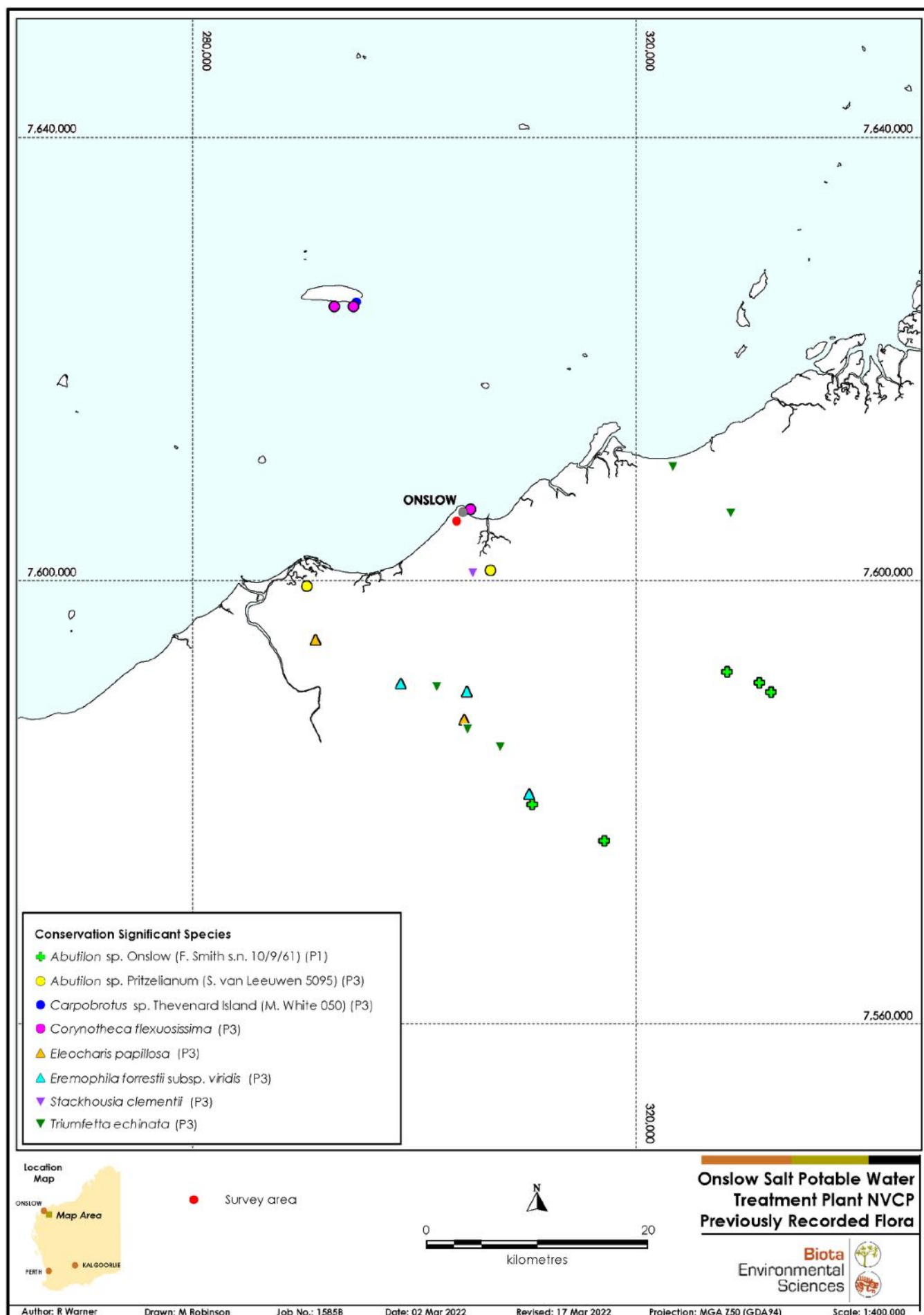


Figure 5.1: Past priority flora records within 40 km of the survey area.

5.3 Fauna

5.3.1 Potential Fauna Assemblage

Database and literature searches yielded a total of 329 vertebrate fauna species with the potential to occur within 40 km of the survey area, including eight introduced mammal species (Table 5.3). Ninety-three species are listed as being conservation significant at either a State or Federal level (Table 5.3). A full list of potential fauna species is presented in Appendix 4.

Table 5.3: Overview of vertebrate fauna species with potential to occur in the survey area.

Fauna Group	Number of Native Species	Number of Conservation-Significant Species	Number of Introduced Species
Amphibians	5	0	0
Avifauna	220	93	14
Ground-dwelling Mammals	15	2	8
Bats	12	3	0
Reptiles	69	1	6
Total	321	99	28

Table 5.4: Vertebrate taxa of conservation significance previously recorded or potentially occurring in study area.

Family	Species Name	Common Name	Conservation Status	
			State	Commonwealth
Herpetofauna				
Pythonidae	<i>Liasis olivaceus barroni</i>	Pilbara Olive Python	Vulnerable	Vulnerable
Mammals				
Dasyuromorphia	<i>Dasyurus hallucatus</i>	Northern Quoll	EN	Endangered
Rodentia	<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse	P4	
Chiroptera	<i>Macroderma gigas</i>	Ghost Bat	VU	Vulnerable
	<i>Rhinonictis aurantia</i> Pilbara form	Pilbara Leaf-nosed Bat	VU	Vulnerable
	<i>Ozimops cobourgianus</i>	Northern Coastal Free-tailed Bat	P1	
Avifauna				
Galliformes	<i>Coturnix pectoralis</i>	Stubble Quail		Marine
Caprimulgiformes	<i>Eurostopodus argus</i>	Spotted Nightjar		Marine
Apodiformes	<i>Apus pacificus</i>	Pacific Swift	Migratory	Marine/Migratory
Cuculiformes	<i>Cacomantis pallidus</i>	Pallid Cuckoo		Marine
Charadriiformes	<i>Himantopus leucocephalus</i>	Pied Stilt		Marine
	<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet		Marine
	<i>Pluvialis fulva</i>	Pacific Golden Plover	Migratory	Migratory/Marine
	<i>Pluvialis squatarola</i>	Grey Plover	Migratory	Migratory/Marine
	<i>Charadrius ruficapillus</i>	Red-capped Plover		Marine
	<i>Charadrius mongolus</i>	Lesser Sand Plover	Endangered; Migratory	Endangered/Migratory/Marine
	<i>Charadrius leschenaultii</i>	Greater Sand Plover	Vulnerable; Migratory	Vulnerable/Migratory/Marine
	<i>Charadrius veredus</i>	Oriental Plover	Migratory	Migratory/Marine
	<i>Rostratula australis</i>	Australian painted-snipe	Endangered	Endangered
	<i>Numenius phaeopus</i>	Eurasian Whimbrel	Migratory	Migratory/Marine
	<i>Numenius minutus</i>	Little Curlew	Migratory	Migratory/Marine
	<i>Numenius madagascariensis</i>	Far Eastern Curlew	Critically Endangered; Migratory	Critically Endangered/Migratory/Marine
	<i>Limosa lapponica</i>	Bar-tailed Godwit	Critically Endangered (ssp. Menzbieri)/VU (ssp. Baueri); Migratory	Endangered (ssp. Menzbieri)/VU (ssp. Baueri)/Migratory/Marine

Family	Species Name	Common Name	Conservation Status	
			State	Commonwealth
	<i>Limosa limosa</i>	Black-tailed Godwit	Migratory	Migratory/Marine
	<i>Arenaria interpres</i>	Ruddy Turnstone	Migratory	Migratory/Marine
	<i>Calidris tenuirostris</i>	Great Knot	Critically Endangered; Migratory	Critically Endangered/Migratory/Marine
	<i>Calidris canutus rogersi</i>	Red Knot (rogersi)	Endangered; Migratory	Endangered/Migratory/Marine
	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Migratory	Migratory/Marine
Charadriiformes cont.	<i>Calidris ferruginea</i>	Curlew Sandpiper	Critically Endangered; Migratory	Critically Endangered/Migratory/Marine
	<i>Calidris subminuta</i>	Long-toed Stint	Migratory	Migratory/Marine
	<i>Calidris ruficollis</i>	Red-necked Stint	Migratory	Migratory/Marine
	<i>Calidris alba</i>	Sanderling	Migratory	Migratory/Marine
	<i>Calidris melanotos</i>	Pectoral Sandpiper	Migratory	Migratory/Marine
	<i>Limnodromus semipalmatus</i>	Asian dowitcher	Migratory	
	<i>Xenus cinereus</i>	Terek Sandpiper	Migratory	Migratory/Marine
	<i>Actitis hypoleucos</i>	Common Sandpiper	Migratory	Migratory/Marine
	<i>Tringa brevipes</i>	Grey-tailed Tattler	Migratory; Priority 4	Migratory
	<i>Tringa stagnatilis</i>	Marsh Sandpiper	Migratory	Migratory/Marine
	<i>Tringa glareola</i>	Wood Sandpiper	Migratory	Migratory/Marine
	<i>Tringa nebularia</i>	Common Greenshank	Migratory	Migratory/Marine
	<i>Stiltia isabella</i>	Australian Pratincole	Migratory	Marine
	<i>Glareola maldivarum</i>	Oriental Pratincole	Migratory	Migratory
	<i>Anous stolidus</i>	Brown noddy	Migratory	Migratory/marine
	<i>Chroicocephalus novaehollandiae</i>	Silver Gull		Marine
	<i>Larus pacificus</i>	Pacific Gull		Marine
	<i>Gelochelidon nilotica</i>	[Common] Gull-billed Tern	Migratory	Migratory/Marine
	<i>Hydroprogne caspia</i>	Caspian Tern	Migratory	Migratory
	<i>Thalasseus bergii</i>	Greater Crested Tern	Migratory	Migratory/Marine
	<i>Thalasseus bengalensis</i>	Lesser Crested Tern		Marine
	<i>Sternula albifrons</i>	Little Tern	Migratory	Migratory/Marine
	<i>Sternula nereis</i>	Fairy Tern	Vulnerable	Vulnerable

Family	Species Name	Common Name	Conservation Status	
			State	Commonwealth
	<i>Onychoprion anaethetus</i>	Bridled Tern	Migratory	Migratory
	<i>Sterna dougallii</i>	Roseate Tern	Migratory	Migratory/Marine
	<i>Sterna hirundo</i>	Common Tern	Migratory	Migratory/Marine
	<i>Chlidonias hybrida</i>	Whiskered Tern		Marine
	<i>Chlidonias leucopterus</i>	White-winged Tern	Migratory	Migratory/Marine
	<i>Stercorarius parasiticus</i>	Parasitic Jaeger	Migratory	Migratory/Marine
Procellariiformes	<i>Oceanites oceanicus</i>	Wilson's Storm Petrel	Migratory	Migratory/Marine
	<i>Thalassarche carteri</i>	Indian yellow-nosed albatross	Endangered Migratory	Vulnerable/migratory/marine
	<i>Macronectes giganteus</i>	Southern giant petrel	Migratory	Endangered/migratory/marine
	<i>Calonectris leucomelas</i>	Streaked Shearwater	Migratory	Migratory/Marine
	<i>Ardena pacifica</i>	Wedge-tailed Shearwater	Migratory	Migratory
	<i>Ardena carneipes</i>	Flesh-footed shearwater	VU; Migratory	Migratory
Suliformes	<i>Fregata ariel</i>	Lesser frigatebird	Migratory	Migratory/marine
Pelecaniformes	<i>Sula leucogaster</i>	Brown Booby	Migratory	Migratory/Marine
Ciconiiformes	<i>Threskiornis molucca</i>	Australian White Ibis		Marine
	<i>Threskiornis spinicollis</i>	Straw-necked Ibis		Marine
	<i>Plegadis falcinellus</i>	Glossy Ibis	Migratory	Migratory/Marine
	<i>Nycticorax caledonicus</i>	Nankeen Night Heron		Marine
	<i>Bubulcus coromandus</i>	Eastern Cattle Egret		Marine
	<i>Ardea alba</i>	Great Egret		Marine
	<i>Ardea intermedia</i>	Intermediate Egret		Marine
	<i>Egretta garzetta</i>	Little Egret		Marine
	<i>Egretta sacra</i>	Pacific Reef Heron		Marine
Pelecaniformes	<i>Pelecanus conspicillatus</i>	Australian Pelican		Marine
Falconiformes	<i>Pandion cristatus</i>	Eastern Osprey	Migratory	Migratory/Marine
	<i>Elanus scriptus</i>	Letter-winged Kite	Priority 4	
	<i>Accipiter fasciatus</i>	Brown Goshawk		Marine
	<i>Circus approximans</i>	Swamp Harrier		Marine
	<i>Haliastur sphenurus</i>	Whistling Kite		Marine
	<i>Haliastur indus</i>	Brahminy Kite		Marine
	<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		Marine
Strigiformes	<i>Ninox boobook</i>	Australian Boobook		Marine

Family	Species Name	Common Name	Conservation Status	
			State	Commonwealth
Coraciiformes	<i>Todiramphus sanctus</i>	Sacred Kingfisher		Marine
	<i>Merops ornatus</i>	Rainbow Bee-eater		Marine
Falconiformes	<i>Falco cenchroides</i>	Nankeen Kestrel		Marine
	<i>Falco hypoleucos</i>	Grey falcon	Vulnerable	Vulnerable
	<i>Falco peregrinus</i>	Peregrine Falcon	OS	
Psittaciiformes	<i>Pezoporus occidentalis</i>	Night parrot	Critically Endangered	Endangered
Passeriformes	<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike		Marine
	<i>Grallina cyanoleuca</i>	Magpie-lark		Marine
	<i>Hirundo neoxena</i>	Welcome Swallow		Marine
	<i>Hirundo rustica</i>	Barn Swallow	Migratory	Migratory
	<i>Petrochelidon nigricans</i>	Tree Martin		Marine
	<i>Zosterops lateralis</i>	Silvereye		Marine
	<i>Motacilla tschutschensis</i>	Eastern Yellow Wagtail	Migratory	Migratory/Marine
	<i>Motacilla cinerea</i>	Grey wagtail	Migratory	Migratory/marine
	<i>Anthus australis</i>	Australian Pipit		Marine

5.3.2 Significant Vertebrate Fauna

Native fauna species that are rare, threatened with extinction, or have high conservation value, are specially protected by law under the WA *Biodiversity Conservation Act 2016* and/or the Commonwealth EPBC Act. Migratory and Marine species are also protected under the EPBC Act as Matters of National Environmental Significance. In addition, the DBCA maintains a list of fauna that are deemed a priority for conservation, which have not been assigned statutory protection under the *Biodiversity Conservation Act 2016*, but are still considered to be of conservation priority, or are considered to be rare but not threatened and are in need of monitoring (DBCA 2020). Appendix 1 details categories of conservation significance recognised under the above frameworks.

A summary of the conservation significant species that were returned for the search area and have potential to occur in the survey area is included in Appendix 4, along with an assessment of their likelihood of occurrence. The likelihood of occurrence of each conservation significant species was considered by assessing species habitat preference, potential habitats available within the survey area, current known fauna distributions and last known records. Within each fauna group, species are presented in descending order of likelihood to occur.

A total of 57 bird species, one reptile species, two ground-dwelling mammal species and three bat species returned from the database searches were listed as conservation-significant under either State or Federal legislation.

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6.0 Vegetation and Flora Results

6.1 Vegetation

The survey area contained one vegetation type, P1 (TeCEIPcAj), occurring on a plain at the base of a low coastal dune and occupying 0.5 ha (83.3% of the survey area). Previously cleared areas fringed the north and west boundary of the survey area, occupying the remaining 0.1 ha (16.7%) (Figure 6.1).

P1: TeCEIPcAj *Triodia epactia* very open hummock grassland over **Cenchrus ciliaris*, (**C. setiger*) tussock grassland over *Ipomoea costata*, **Aerva javanica* very open herbland.

This was the only vegetation unit recorded, covering 83.3% of the 0.6 ha area. Approximately 35 individuals of the Priority 3 species *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095) occurred within this vegetation unit, near the northern boundary of the survey area only (see Section 6.2). Other species present included *Acacia coriacea* subsp. *coriacea*, *A. stellaticeps*, *Aristida holathera* var. *holathera*, *Rhagodia eremaea*, *Salsola australis*, **Tribulus terrestris* and *Trichodesma zeylanicum* var. *zeylanicum*. One relevé was established in vegetation unit P1 (POT01; see Figure 6.1).

There was no sign of recent fire, and the condition of the vegetation was Poor to Degraded due to the presence of four weed species, three present in high densities (**Cenchrus* spp. and **Aerva javanica*; e.g. Plate 6.2), rubbish, erosion and signs of previous disturbance (see Figure 6.2). The area was previously disturbed during construction activities some 20 years ago (Robert Lund, OSPL pers. Comm, 2021), and lies adjacent to a very old fenceline (bordering the northern and eastern boundary of the survey area; see background of Plate 6.1 and Plate 6.2).

The vegetation described in the survey area does not represent a listed TEC or PEC.



Plate 6.1: Vegetation type P1: TeCEIPcAj.



Plate 6.2: Weed species **Aerva javanica* and **Cenchrus ciliaris*.

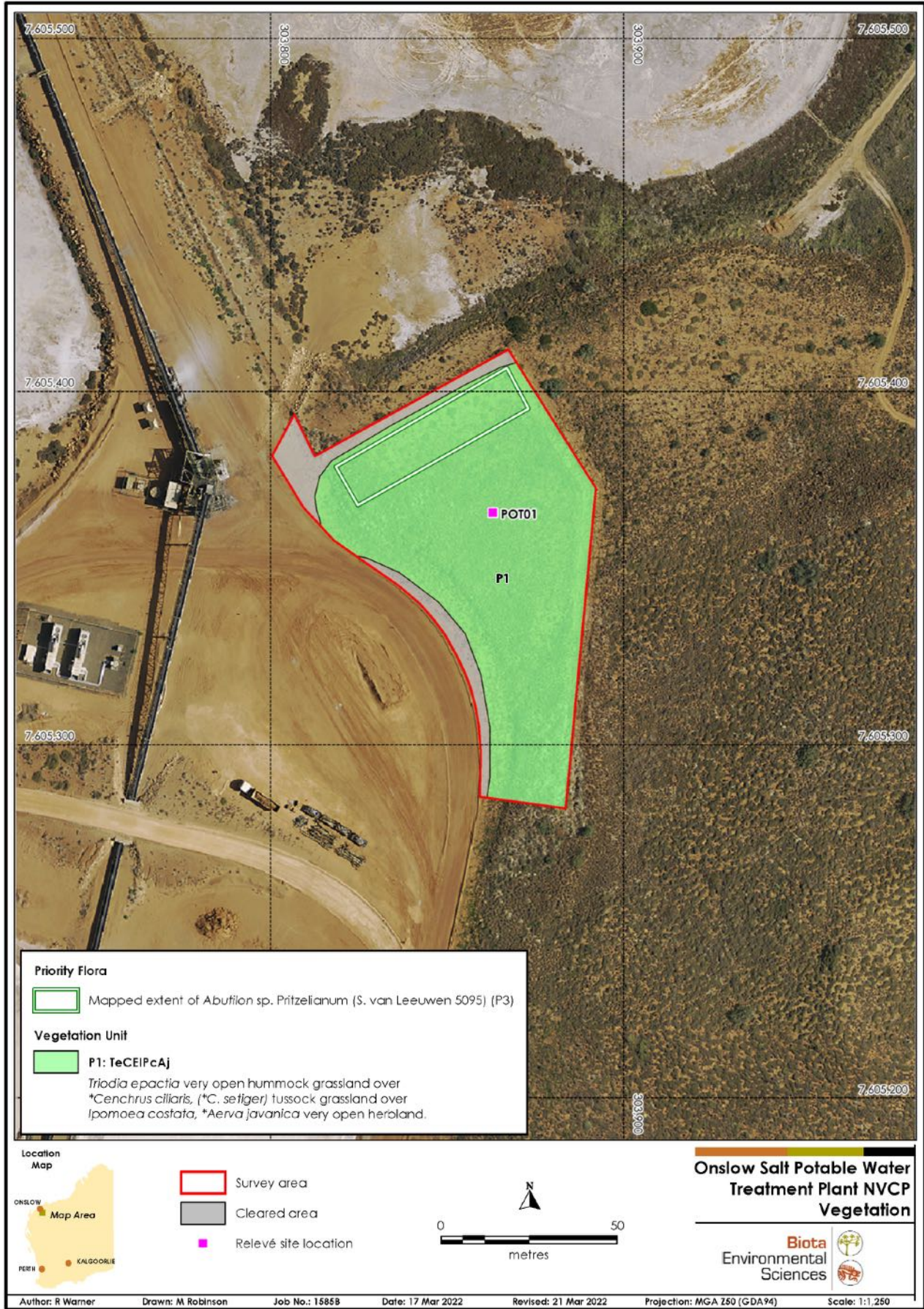


Figure 6.1: Vegetation of the survey area.

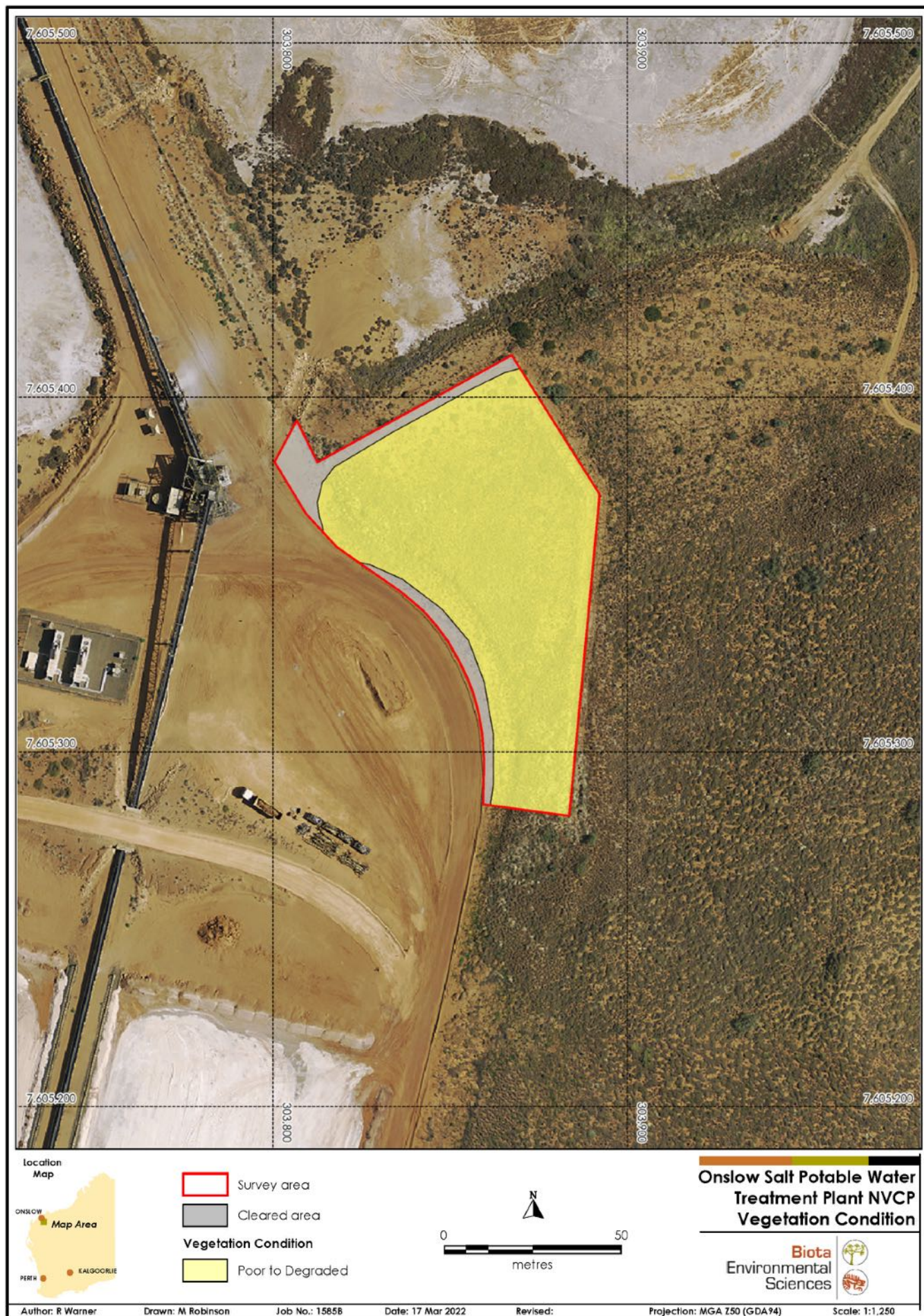


Figure 6.2: Vegetation condition of the survey area.

6.2 Flora

A total of 13 native vascular flora species from 12 genera and 8 families were recorded from the survey area (see Appendix 6). Fabaceae was the dominant family within the survey area, accounting for five of the 13 native species, while Chenopodiaceae accounted for a further three species. *Acacia* and *Indigofera* were the dominant genera among the native species (two species each). These families and genera are typically represented in species lists from this region.

Thirty-five individuals of the Priority 3 species *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095) were recorded within the survey area. All individuals occurred within a 0.07 ha section of the survey area bordering the northern boundary as shown in Figure 6.3. *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095) is a perennial shrub growing to 1.5 m tall with yellow-orange flowers in August (WA Herbarium 2021). This species occurs on sand plains with orange-brown sandy loam substrate and is distributed over a range of more than 700 km, extending from the southern Carnarvon bioregion through to Port Hedland in the Pilbara (WA Herbarium 2022).

A total of four invasive flora species (weeds) from three genera and three families were recorded within the survey area (**Aerva javanica*, **Cenchrus ciliaris*, **C. setiger* and **Tribulus terrestris*). None of these species are listed as significant under State or Federal legislation (DAFWA 2018a, DoEE 2018).



Plate 6.3: *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095) individual.

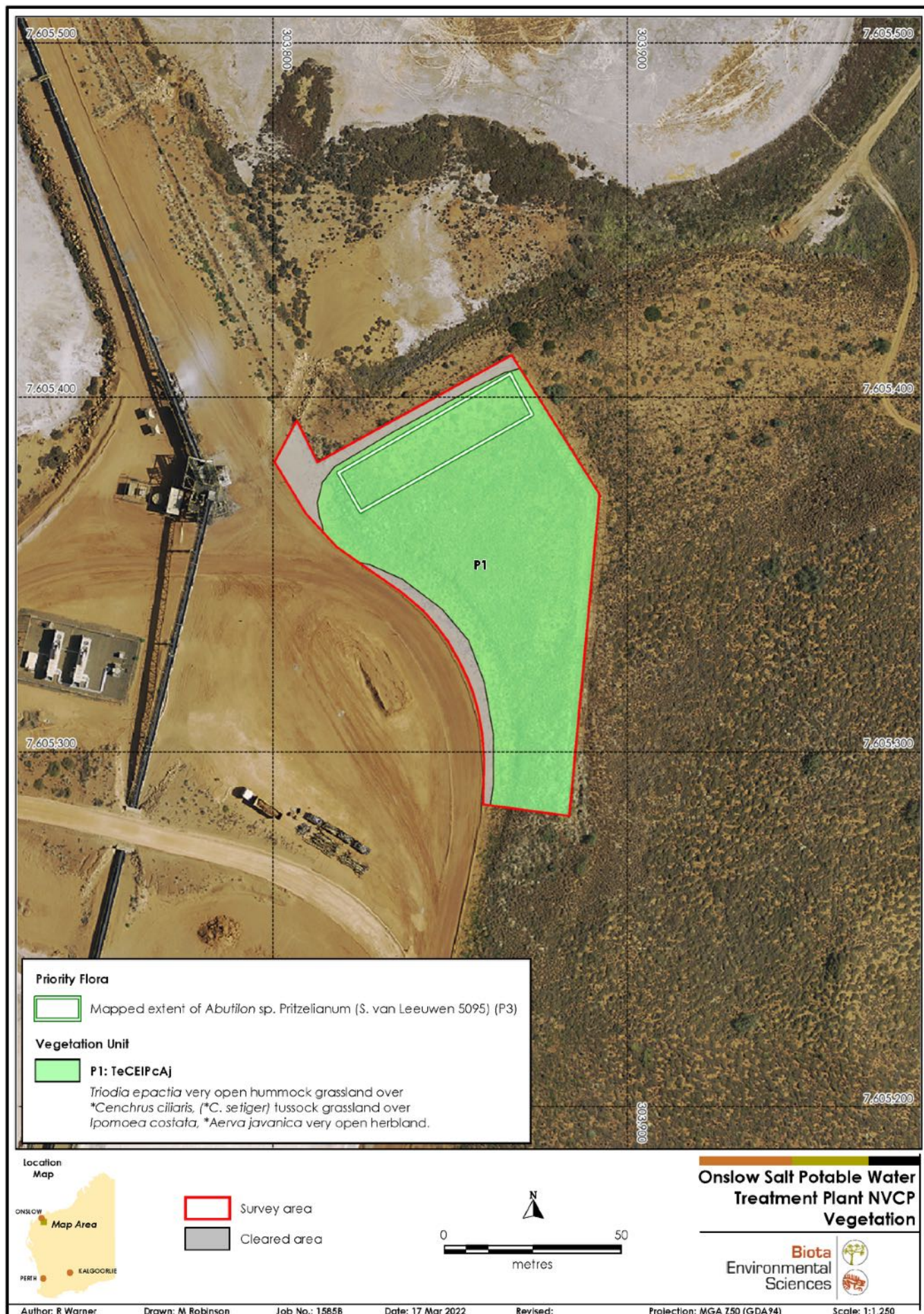


Figure 6.3: Mapped extent of *Abutilon* sp. *Pritzelianum* (S. van Leeuwen 5095) recorded in the survey area.

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7.0 Terrestrial Fauna Results

One fauna habitat was defined in the survey area, *Triodia epactia* very open hummock grassland over *Cenchrus ciliaris*, (*C. setiger*) tussock grassland, as described in Section 6.1. No important fauna habitat was identified in the survey area.

Three reptiles were sighted and identified to genus level only, including two genera of skink (Scincidae) and one dragon genus (Agamidae). None of the recorded reptiles are likely to be of conservation significance.

Following the field survey, a final likelihood assessment ranking was made for the 62 significant vertebrate fauna species with the potential to occur in the survey area, as identified in the desktop study (Section 5.3.2).

Based on the final likelihood assessment, seven of the 62 significant species considered were ranked as 'likely to occur' or 'may occur'. The remaining 56 significant species were ranked as 'unlikely to occur' or "would not occur" (see Appendix 4).

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8.0 Conclusions

8.1 Vegetation of Significance

One vegetation type was described and mapped for the survey area. This is considered to be within the range expected for a 0.6 ha area in this locality, taking into account the one habitat present and the scale of vegetation mapping. The condition of the vegetation was rated as Poor to Degraded and it is not representative of any TEC or PEC, or otherwise considered to have any elevated conservation significance.

8.2 Flora of Significance

A total of 13 native vascular flora species from 12 genera and 8 families were recorded during the survey. This is within the range expected for a study area of this size in this locality. No Threatened flora species were recorded and none are considered as likely to occur. One Priority 3 species, *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095), was recorded, with 35 individuals occurred in a 0.07 ha section along the northern boundary. Clearing this area should be avoided. No other Priority flora species are considered likely to occur.

8.3 Introduced Flora

A total of four introduced (weed) species were recorded from the study area, **Aerva javanica*, **Cenchrus ciliaris*, **C. setiger* and *Tribulus terrestris*. None of these are listed WoNS (DoEE 2018) or declared pests under the WA Biosecurity and Agriculture Management Act 2007 (DAFWA 2018b).

8.4 Fauna of Significance

No evidence of fauna of significance were recorded in the study area during the survey. On the basis of the desktop study, seven species of significant fauna were assessed as either likely to or may occur in the study area. The small extent of the study area and the wider distributions of the species suggest it would be unlikely that major impacts on any significant species would arise because of the clearing, should they be present.

8.5 Assessment Against the Ten Clearing Principles

A general assessment of the proposal to clear land within the survey area against each of the 10 clearing principles, as outlined in Schedule 5 of the *Environmental Protection Act 1986* (EP Act), is provided in Table 8.1.

Table 8.1: Assessment of vegetation within the survey area against the ten clearing principles.

Clearing Principle	Justification of Variance	Assessment
A	Native vegetation should not be cleared if it comprises a high level of biological diversity.	
	<p>Flora</p> <p>The survey area is not located within a known biodiversity hotspot for WA (Department of the Agriculture, Water and the Environment 2020).</p> <p>Vascular flora species diversity recorded within the survey area was considered to be low; a total of 13 native flora species from 8 families were recorded within the 0.6 ha survey area. This number is not considered to represent an unusually high level of species diversity given the location and the vegetation types present. One Priority 3 flora species, <i>Abutilon</i> sp. Pritzelianum (S. van Leeuwen 5095) was recorded during the survey. Onslow Salt intends to avoid clearing these individuals. No other conservation significant flora species were deemed likely to occur following the field survey.</p> <p>Fauna</p> <p>The scope of the assessment did not include a comprehensive census of vertebrate fauna in the survey area however on the basis of the desktop study, 329 vertebrate fauna species have the potential to occur in the survey area, of which 63 are significant species. Seven of the 63 species considered as potentially occurring were assessed as either 'likely to occur' or 'may occur' based on the habitats present.</p> <p>The clearing footprint for the project is small (0.6 ha); neither the vascular flora species diversity nor the fauna species diversity would be affected by clearing at this small scale.</p>	Unlikely to be at Variance
B	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	
	One fauna habitat was recorded in the survey area, <i>Triodia epactia</i> very open hummock grassland over <i>*Cenchrus ciliaris</i> , (<i>*C. setiger</i>) tussock grassland, which occurs widely in the broader locality. The proposal's clearing footprint is small (0.6 ha) and the vegetation is unlikely to be considered significant habitat for any significant fauna species.	Unlikely to be at Variance
C	Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	
	<p>The results of the desktop study show that no records of any Threatened flora species occurring within 40 km of the survey area, and none were recorded.</p> <p>One Priority flora species was recorded in the survey area, <i>Abutilon</i> sp. Pritzelianum (S. van Leeuwen 5095). This species has been recorded on the dunes in the Onslow locality in recent surveys (see Table 5.1). Clearing of the mapped extent of this species should be avoided. No other Priority flora species are considered to have the potential to occur, given the habitats present.</p> <p>Assuming the mapped extent of <i>Abutilon</i> sp. Pritzelianum (S. van Leeuwen 5095) is not cleared, the proposal is unlikely to be at variance with this principle.</p>	Unlikely to be at Variance

D	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.	
	None of the vegetation within the survey area was considered to be analogous to any TECs defined at State or Commonwealth level. The proposed clearing is not at variance with this principle.	Not at Variance
E	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	
	<p>The study area contains one broad -scale regional vegetation unit described as Cape Yannare Coastal Plain: Hummock grasslands, grass steppe; soft spinifex (1975a, 1975b). The current extent of this vegetation unit in the Cape Range and Roebourne subregions is 57,809.6 ha (91.2 %) of the pre-European extent (see Section 3.4).</p> <p>The proposed clearing is not within a significantly cleared landscape and does not represent an ecological linkage. Clearing of up to 0.6 ha would represent a very minor increment on historical clearing.</p>	Unlikely to be at Variance
F	Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	
	There are no watercourses or wetlands within or near the survey area. The nearest watercourse is the Ashburton River some 20 km to the southwest of the survey area. The proposal is unlikely to be at variance with this principle.	Unlikely to be at Variance
G	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	
	Given its very small scale, it is considered unlikely that the proposal would contribute significantly to land degradation in the survey area.	Unlikely to be at Variance
H	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	
	<p>No conservation reserves occur within the survey area. The closest conservation estate to the survey area is the Thevenard Island Reserve, some 21 km to the northwest of the survey area.</p> <p>Given the small amount of clearing required, it is unlikely to affect any conservation estate.</p>	Unlikely to be at Variance
I	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	
	The proposed clearing does not intersect any waterbodies. Provided that the construction avoids any excavations below the water table level, there is no reason to expect that the clearing would affect the quality of surface or underground water.	Unlikely to be at Variance
J	Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.	
	No permanent surface water sources or wetlands occur in the survey area. The sandy soil would provide rapid infiltration of rainfall events while any areas of saline loam would be more susceptible to flooding. However, due to the small size of the survey area and proposed clearing (0.6 ha), any clearing of vegetation is unlikely to affect the intensity or incidence of flooding.	Unlikely to be at Variance

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9.0 References

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Appendix 1

Framework for Conservation Significance Ranking of Species and Communities in WA



A. Definitions, Categories and Criteria for Threatened and Priority Ecological Communities

Species and Communities Branch, Department of Environment and Conservation, December 2010.

1. General Definitions

Ecological Community

A naturally occurring biological assemblage that occurs in a particular type of habitat.

Note: The scale at which biological 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) is one which is found to fit into one of the following categories; "presumed totally destroyed", "critically endangered", "endangered" or "vulnerable".

Possible threatened ecological communities that do not meet survey criteria are added to the Department of Parks and Wildlife's Priority Ecological Community Lists under Priorities 1, 2 and 3. Ecological Communities that are adequately known, 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.

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

Habitat is defined as the areas in which an organism and/or assemblage of organisms lives. It includes the abiotic factors (e.g. substrate and topography), and the biotic factors.

Occurrence: a discrete example of an ecological community, separated from other examples of the same community by more than 20 metres of a different ecological community, an artificial surface or a totally destroyed community.

By ensuring that every discrete occurrence is recognised and recorded future changes in status can be readily monitored.

Adequately Surveyed is defined as follows:

"An ecological community that has been searched for thoroughly in most likely habitats, by relevant experts."

Community structure is defined as follows:

"The spatial organisation, construction and arrangement of the biological elements comprising a biological assemblage" (e.g. *Eucalyptus salmonophloia* woodland over scattered small shrubs over dense herbs; structure in a faunal assemblage could refer to trophic structure, e.g. dominance by feeders on detritus as distinct from feeders on live plants).

Definitions of **Modification** and **Destruction** of an ecological community:

Modification: "changes to some or all of ecological processes (including abiotic processes such as hydrology), species composition and community structure as a direct or indirect result of human activities. The level of damage involved could be ameliorated naturally or by human intervention."

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

Note: Modification and destruction are difficult concepts to quantify, and their application will be determined by scientific judgement. Examples of modification and total destruction are cited below:

Modification of ecological processes: The hydrology of Toolibin Lake has been altered by clearing of the catchment such that death of some of the original flora has occurred due to dependence on fresh water. The system may be brought back to a semblance of the original state by redirecting saline runoff and pumping waters of the rising underground watertable away to restore the hydrological balance. Total destruction of downstream lakes has occurred due to hydrology being altered to the point that few of the original flora or fauna species are able to tolerate the level of salinity and/or water logging.

Modification of structure: The understorey of a plant community may be altered by weed invasion due to nutrient enrichment by addition of fertiliser. Should the additional nutrients be removed from the system the balance may be restored, and the original plant species better able to compete. Total destruction may

occur if additional nutrients continue to be added to the system causing the understorey to be completely replaced by weed species, and death of overstorey species due to inability to tolerate high nutrient levels. Modification of species composition: Pollution may cause alteration of the invertebrate species present in a freshwater lake. Removal of pollutants may allow the return of the original inhabitant species. Addition of residual highly toxic substances may cause permanent changes to water quality, and total destruction of the community.

Threatening processes are defined as follows:

"Any process or activity that threatens to destroy or significantly modify the ecological community and/or affect the continuing evolutionary processes within any ecological community."

Examples of some of the continuing threatening processes in Western Australia include: general pollution; competition, predation and change induced in ecological communities as a result of introduced animals; competition and displacement of native plants by introduced species; hydrological changes; inappropriate fire regimes; diseases resulting from introduced micro-organisms; 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.

2. Definitions and Criteria for Presumed Totally Destroyed, Critically Endangered, Endangered and Vulnerable Ecological Communities

ECOLOGICAL COMMUNITIES

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.

An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies (A or B):

- A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or
- B) All occurrences recorded within the last 50 years have since been destroyed

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.

An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C):

- A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii):
 - i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years);
 - ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.
- B) Current distribution is limited, and one or more of the following apply (i, ii or iii):
 - i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years);

- ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes;
 - iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.
- C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).

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.

An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C):

- A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii):
 - i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);
 - ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.
- B) Current distribution is limited, and one or more of the following apply (i, ii or iii):
 - i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);
 - ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;
 - iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.
- C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).

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.

An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B or C):

- A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.
- B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.
- C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.

3. Definitions and Criteria for Priority Ecological Communities

PRIORITY ECOLOGICAL COMMUNITY LIST

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community Lists under Priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as threatened ecological communities. 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 with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist. 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 small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. 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 within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;
- (iii) communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.

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.

- (a) 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.
- (b) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.
- (c) 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.

B. Categories for Flora and Fauna Species

1. Western Australian Biodiversity Conservation Act 2016, and Priority Species Classification

In Western Australia, 'Threatened', 'Extinct' and 'Specially Protected' fauna and flora species are protected under the *Biodiversity Conservation Act 2016* (the BC Act), making it an offence to take or disturb these species without Ministerial approval. The definition of 'take' is broad, and includes killing, injuring, harvesting or capturing fauna, and gathering, cutting, destroying, harvesting or damaging flora.

Such species are classified within a framework of several categories.

Species of the highest conservation significance are designated as Threatened species and are protected under sections 19(1)(a), 19(1)(b) and 19(1)(c) of the BC Act. Species are listed within one of three categories:

- Critically endangered (CR), Endangered (EN), or Vulnerable (V), representing those species listed in Schedules 1 to 3 respectively of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* or the *Wildlife Conservation (Rare Flora) Notice 2018*.

Presumed extinct species are protected under sections 24 and 25 of the BC Act and are listed in one of two categories:

- Extinct (EX), representing those species listed in Schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* or the *Wildlife Conservation (Rare Flora) Notice 2018*; or
- Extinct in the wild (EW); there are currently no listed species under this category.

Specially protected species are protected under section 13(1) of the BC Act, and include species of special conservation interest, migratory species, cetaceans, species subject to international agreement, or species otherwise in need of special protection. Of these:

- Migratory species (MI) are those listed under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*;
- Species of special conservation interest (conservation dependent fauna) (CD) are those listed under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*; and
- Other specially protected fauna (OS) are those listed under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*;

In addition to the species formally designated as protected under the BC Act, the WA Department of Biodiversity, Conservation and Attractions (DBCA) also maintains a list of 'Priority species'.

Species that appear to be rare or threatened, but for which there is insufficient information to properly evaluate their conservation significance, are assigned to one of three Priority categories (Priority 1 to Priority 3), while species that are adequately known but require regular monitoring are assigned to Priority 4.

Note that of the above classifications, only 'Threatened', 'Extinct' and 'Specially Protected' species have statutory standing. The Priority flora and fauna classifications are employed by the WA DBCA to manage and classify their database of species considered potentially rare or at risk, but these categories have no legislative status.

Further explanations of the categories is provided in more detail in the following pages.

CONSERVATION CODES

For Western Australian Flora and Fauna

Threatened, Extinct and Specially Protected fauna or flora¹ are species² which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*.

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T **Threatened species**

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

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX 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.

1 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.

2 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.

3 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.

4 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.

¹ The definition of flora includes algae, fungi and lichens

² 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).

2. Commonwealth Environment Protection and Biodiversity Conservation Act 1999

Many of the species that are specially protected at State level are also listed as Threatened species at the Federal level, as one of the Matters of National Environmental Significance (MNES) identified under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act). These may be classified as 'critically endangered', 'endangered', 'vulnerable' or 'lower risk', consistent with IUCN categories:

1. **Critically Endangered (CR):** a taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.
2. **Endangered (EN):** a taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future.
3. **Vulnerable (VU):** a taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future.
4. **Lower Risk (LR):** a taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into three subcategories:
 - **Conservation Dependent (CD).** Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation program targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.
 - **Near Threatened (NT).** Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.
 - **Least Concern (LC).** Taxa which do not qualify for Conservation Dependent or Near Threatened.

In addition, numerous Migratory species are listed as MNES under the EPBC Act (some of which are also listed as Threatened). Migratory species are those animals that migrate to Australia and its external territories, or pass through or over Australian waters during their annual migrations. The list of migratory species consists of those species listed under the following international conventions:

1. Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention);
2. China-Australia Migratory Bird Agreement (CAMBA);
3. Japan-Australia Migratory Bird Agreement (JAMBA); and,
4. Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

Marine species are also protected under the EPBC Act, and are listed to ensure the long-term conservation of the species. Marine species include all Australian sea snakes, seals, crocodiles, dugongs, marine turtles, seahorses and seabirds that naturally occur in the Commonwealth marine area.

Under the terms of the EPBC Act, an action (e.g. a project or development) is required to be referred to the Australian Government Environment Minister for approval if it has, will have, or is likely to have, a significant impact on an MNES. The term 'action' includes projects and developments subsequent to commencement of the Act, however there are a number of exemptions (e.g. projects in Commonwealth areas). According to Department of the Environment (2013), a 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.

References:

Department of the Environment (2013). Matters of National Environmental Significance - Significant Impact Guidelines 1.1 *Environment Protection and Biodiversity Conservation Act 1999*. Department of the Environment, Canberra, Australia.

Appendix 2

EPBC Act Protected Matters Database Search Results





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: 01-Feb-2022

[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:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	33
Listed Migratory Species:	55

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	3
Commonwealth Heritage Places:	None
Listed Marine Species:	90
Whales and Other Cetaceans:	26
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	3

Extra Information

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

State and Territory Reserves:	8
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	31
Key Ecological Features (Marine):	3
Biologically Important Areas:	15
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area

[Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name	Buffer Status
EEZ and Territorial Sea	In buffer area only

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			
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may 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
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely 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

Scientific Name	Threatened Category	Presence Text	Buffer Status
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In feature area
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
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area	In buffer area only
FISH			
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only
MAMMAL			
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area	In feature area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur within area	In buffer area only
Rhinonictoris aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat may occur within area	In buffer area only
REPTILE			
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
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	Foraging, feeding or related behaviour 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	Breeding likely to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding 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 known to occur within area	In buffer area only
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known 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 may 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 may occur within area	In buffer area only
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area	In buffer area only
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to 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
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area	In buffer area only
Sterna dougallii Roseate Tern [817]		Breeding 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
Migratory Marine Species			
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area	In buffer area only
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		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 likely to occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour 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	Breeding likely to occur within area	In feature area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area	In buffer area only
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area	In feature area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat may occur within area	In buffer area only
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area	In buffer area only
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding 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
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding 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
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area	In buffer area only
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Sousa sahalensis as Sousa chinensis Australian Humpback Dolphin [87942]		Species or species habitat likely to occur within area	In buffer area only
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area	In buffer area only
Migratory Terrestrial Species			
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may 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 melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area	In feature area
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 feature area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area	In feature area
Limnodromus semipalmatus Asian Dowitcher [843]		Species or species habitat may occur within area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within 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

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In feature area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands

[[Resource Information](#)]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Unknown		
Commonwealth Land - [50385]	WA	In buffer area only
Commonwealth Land - [51887]	WA	In buffer area only
Commonwealth Land - [51104]	WA	In buffer area only

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 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
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Ardenna pacifica as Puffinus pacificus Wedge-tailed Shearwater [84292]		Breeding 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 canutus Red Knot, Knot [855]	Endangered	Species or species habitat may 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 likely to occur within area overfly marine area	In feature area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within 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
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 overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to 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
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area overfly marine area	In feature area
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area	In buffer area only
Limnodromus semipalmatus Asian Dowitcher [843]		Species or species habitat may occur within area overfly marine area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		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
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

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla flava Yellow Wagtail [644]		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
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area	In buffer area only
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area	In buffer area only
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In feature area
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]		Breeding 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
Sternula nereis as Sterna nereis Fairy Tern [82949]		Breeding known to occur within area	In buffer area only
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalasseus bengalensis as Sterna bengalensis Lesser Crested Tern [66546]		Breeding known to occur within area	In feature area
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area	In feature area
Fish			
Acentronura larsonae Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area	In buffer area only
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area	In buffer area only
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area	In buffer area only
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area	In buffer area only
Choeroichthys latispinosus Muiron Island Pipefish [66196]		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
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area	In buffer area only
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area	In buffer area only
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area	In buffer area only
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
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
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area	In buffer area only
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area	In buffer area only
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area	In buffer area only
Halicampus spinirostris Spiny-snout Pipefish [66225]		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
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		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 kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
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
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area	In buffer area only
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area	In buffer area only
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		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
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
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area	In buffer area only
Mammal			
Dugong dugon Dugong [28]		Species or species habitat known to occur within area	In buffer area only
Reptile			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Acalyptophis peronii Horned Seasnake [1114]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Aipysurus apraefrontalis Short-nosed Seasnake [1115]		Species or species habitat likely to occur within area	In feature area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area	In buffer area only
Aipysurus eydouxii Spine-tailed Seasnake [1117]		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
Astrotia stokesii Stokes' Seasnake [1122]	Endangered	Species or species habitat may occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]		Foraging, feeding or related behaviour known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]		Breeding known to occur within area	In feature area
Chitulia ornata as Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [87377]	Endangered	Species or species habitat may occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]		Breeding likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Disteira kingii Spectacled Seasnake [1123]	Vulnerable	Species or species habitat may occur within area	In buffer area only
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
Eretmochelys imbricata Hawksbill Turtle [1766]		Breeding known to occur within area	In feature area
Hydrophis elegans Elegant Seasnake [1104]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Leioselasma czeblukovi as Hydrophis czeblukovi Fine-spined Seasnake, Geometrical Seasnake [87374]		Species or species habitat may occur within area	In buffer area only
Natator depressus Flatback Turtle [59257]		Breeding 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]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Balaenoptera borealis Sei Whale [34]		Species or species habitat likely to occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to 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 may occur within area	In buffer area only
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area	In buffer area only
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area	In buffer area only
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In buffer area only
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area	In buffer area only
Kogia sima as Kogia simus Dwarf Sperm Whale [85043]		Species or species habitat may occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area	In buffer area only
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area	In buffer area only
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area	In buffer area only
Sousa sahalensis as Sousa chinensis Australian Humpback Dolphin [87942]		Species or species habitat likely to 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
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area	In buffer area only
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area	In buffer area only
Steno bredanensis Rough-toothed Dolphin [30]		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 aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In buffer area only
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		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
Aug - Sep			
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur	In buffer area only
Dec - Jan			
Chelonia mydas Green Turtle [1765]	Nesting	Known to occur	In buffer area only
Nov - May			
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur	In buffer area only

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Airlie Island	Nature Reserve	WA	In buffer area only
Bessieres Island	Nature Reserve	WA	In buffer area only
Cane River (Mount Minnie and Nanutarra)	NRS Addition - Gazettal in Progress	WA	In buffer area only
Little Rocky Island	Nature Reserve	WA	In buffer area only
Locker Island	Nature Reserve	WA	In buffer area only
Thevenard Island	Nature Reserve	WA	In buffer area only
Unnamed WA40322	5(1)(h) Reserve	WA	In buffer area only
Unnamed WA44665	5(1)(h) Reserve	WA	In buffer area only

Nationally Important Wetlands		[Resource Information]
Wetland Name	State	Buffer Status

Wetland Name			State	Buffer Status	
Exmouth Gulf East			WA	In buffer area only	
EPBC Act Referrals			[Resource Information]		
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status	
Controlled action					
Ashburton Infrastructure Project	2021/9064	Controlled Action	Referral Decision	In buffer area only	
Construct and operate LNG & domestic gas plant including onshore and offshore facilities - Wheatstone	2008/4469	Controlled Action	Post-Approval	In feature area	
Construction and operation of a Solar Salt Project, SW Onslow, WA	2016/7793	Controlled Action	Assessment Approach	In buffer area only	
Greater Gorgon Development - Optical Fibre Cable, Mainland to Barrow Island	2005/2141	Controlled Action	Completed	In feature area	
Proposed West Pilbara Iron Ore Project	2009/4706	Controlled Action	Post-Approval	In buffer area only	
Yannarie Solar Salt Project	2004/1679	Controlled Action	Completed	In buffer area only	
Not controlled action					
Airlie Island soil and groundwater investigations, Exmouth Gulf, offshore Pilbara coast	2014/7250	Not Controlled Action	Completed	In buffer area only	
Baniyas-1 Exploration Well, EP-424, near Onslow	2007/3282	Not Controlled Action	Completed	In buffer area only	
Construct 110km buried natural gas pipeline from Onslow, connecting to Dampier/Bunbury natural gas pipeline	2013/7039	Not Controlled Action	Completed	In buffer area only	
Exploration Well (Taunton-2)	2002/731	Not Controlled Action	Completed	In buffer area only	
HCA05X Macedon Experimental Survey	2004/1926	Not Controlled Action	Completed	In buffer area only	
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area	
Infill Production Well (Griffin-9)	2001/417	Not Controlled Action	Completed	In buffer area only	
Klammer 2D Seismic Survey	2002/868	Not Controlled Action	Completed	In buffer area only	
Onslow Power Infrastructure Upgrade Project, Onslow, WA	2014/7314	Not Controlled Action	Completed	In buffer area only	

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Onslow Rare Earths Plant	2021/9046	Not Controlled Action	Completed	In buffer area only
Onslow Water Supply Infrastructure Upgrade Project, Onslow, WA	2014/7329	Not Controlled Action	Completed	In buffer area only
Subsea Gas Pipeline From Stybarrow Field to Griffin Venture Gas Export Pipeline	2005/2033	Not Controlled Action	Completed	In buffer area only
Thevenard Island Retirement Project	2015/7423	Not Controlled Action	Completed	In buffer area only
To construct and operate an offshore submarine fibre optic cable, WA	2014/7373	Not Controlled Action	Completed	In buffer area only
Wanda Offshore Research Project, 80 km north-east of Exmouth, WA	2018/8293	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
'Kate' 3D marine seismic survey, exploration permits WA-320-P and WA-345-P, 60km	2005/2037	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
2D and 3D seismic surveys	2005/2151	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Babylon 3D Marine Seismic Survey, Commonwealth Waters, nr Exmouth WA	2013/7081	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Huzzas MC3D Marine Seismic Survey (HZ-13) Carnarvon Basin, offshore WA	2013/7003	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Huzzas phase 2 marine seismic survey, Exmouth Plateau, Northern Carnarvon Basin, WA	2013/7093	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Macedon Gas Field Development	2008/4605	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Munmorah 2D seismic survey within permits WA-308/9-P	2003/970	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner)				
Ocean Bottom Cable Seismic Survey	2005/2017	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Onslow Seawater Desalination Plant Marine Geophysical Investigation	2020/8794	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Referral decision				
3D Marine Seismic Survey in the offshore northwest Carnarvon Basin	2011/6175	Referral Decision	Completed	In buffer area only

Key Ecological Features

[[Resource Information](#)]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region	Buffer Status
Ancient coastline at 125 m depth contour	North-west	In buffer area only
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	North-west	In buffer area only
Continental Slope Demersal Fish Communities	North-west	In buffer area only

Biologically Important Areas			
Scientific Name	Behaviour	Presence	Buffer Status
Marine Turtles			
Chelonia mydas Green Turtle [1765]	Aggregation	Known to occur	In buffer area only
Chelonia mydas Green Turtle [1765]	Foraging	Known to occur	In buffer area only
Eretmochelys imbricata Hawksbill Turtle [1766]	Foraging	Known to occur	In buffer area only
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting buffer	Known to occur	In buffer area only
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur	In buffer area only
Natator depressus Flatback Turtle [59257]	Foraging	Known to occur	In buffer area only

Scientific Name	Behaviour	Presence	Buffer Status
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur	In buffer area only
Natator depressus Flatback Turtle [59257]	Nesting	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
Sternula nereis Fairy Tern [82949]	Breeding	Known to occur	In buffer area only
Thalasseus bengalensis Lesser Crested Tern [66546]	Breeding	Known to occur	In feature area
Sharks			
Rhincodon typus Whale Shark [66680]	Foraging	Known to occur	In buffer area only
Whales			
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Distribution	Known to occur	In buffer area only
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 3

Significant Flora Species Recorded within 40 km and their Likelihood of Occurrence



Taxon	Habit and Habitat (WA Herbarium 2020)	Source		Likelihood of Occurrence in Survey Area	
		DBCA TPFL	WA Herbarium	Initial Ranking Based on Desktop Study	Final Ranking Including Results of Field Survey
Priority 1					
<i>Abutilon</i> sp. Onslow (F. Smith s.n. 10/9/61)	Prostrate perennial shrub or herb to 1 m, typically growing on sand plains	✓	✓	May occur; suitable habitat and several records in locality (NR 28 km SSE).	Unlikely to occur.
Priority 3					
<i>Abutilon</i> sp. Pritzelianum (S. van Leeuwen 5095)	Shrub to 1.5 m growing on sand plains and dunes.		✓	Likely to occur; suitable habitat and record in close proximity (NR 5 km SE).	Recorded.
<i>Carpobrotus</i> sp. Thevenard Island (M. White 050)	Prostrate, succulent perennial herb to 1.5 m tall, growing on dunes and in disturbed areas.	✓	✓	Would not occur; no mainland records (NR 24 km NNW).	Would not occur.
<i>Corynotheca flexuosissima</i>	Rhizomatous perennial herb or shrub to 60 cm tall, growing on coastal dunes in sand or limestone.		✓	Unlikely to occur; no mainland records in locality (NR 23 km NNW).	Unlikely to occur.
<i>Eleocharis papillosa</i>	Annual herb to 10 cm tall, growing on clay plains.		✓	Unlikely to occur; no suitable habitat (NR 18 km SW).	Would not occur.
<i>Eremophila forrestii</i> subsp. <i>viridis</i>	Much-branched shrub to 1 m tall, growing on plains, dunes, interdunal swales.		✓	May occur; suitable habitat and record in close proximity (NR 17 km S).	Unlikely to occur.
<i>Stackhousia clementii</i>	Dense perennial herb to 45 cm tall, growing in coastal plains and sandstone hills.		✓	May occur; suitable habitat and one record in close proximity (NR 5 km S).	Would not occur.
<i>Triumfetta echinata</i>	Prostrate shrub to 30 cm tall, growing on sand dunes.		✓	May occur; suitable habitat and one coastal record in close proximity (NR 16 km SSW).	Unlikely to occur.

Appendix 4

Significant Fauna Species Recorded within 40 km and their Likelihood of Occurrence



FAUNA GROUP	Conservation Status		Record Source				Previous Surveys			Habitat Preference	Habitat Potentially Available in Survey area?	Likelihood of Occurrence in Survey area	
Scientific Name Common Name	State	Federal	ALA	eBird	EPBC	DBCA	Biota 2009	Biota 2010c	Ashburton Salt			Initial Ranking Based on Desktop Study	Final Ranking Including Results of Field Survey
REPTILES													
<i>Liasis olivaceus barroni</i> Pilbara Olive Python	Vulnerable	Vulnerable				•			•	Rocky areas within the Pilbara, showing a preference for rocky gorges containing water in streams and rock pools	-	Would not occur	Would not occur
MAMMALS													
<i>Dasyurus hallucatus</i> Northern Quoll	Endangered	Endangered			•		•			Rocky areas and tall open coastal eucalypt forests, sandstone escarpment	-	Would not occur	Would not occur
<i>Pseudomys chapmani</i> Western Pebble-mound Mouse	Priority 4							•		Stony hillsides with hummock grasslands in the central and eastern parts of the Pilbara.	-	Would not occur	Would not occur
<i>Rhinonictis aurantia</i> Pilbara form Pilbara Leaf-nosed Bat	Vulnerable	Vulnerable			•					Reliant on roost sites in caves or mine adits with stable, very hot (28 – 32°C) and very humid (96 – 100 %) microclimates. Forages over wide range of habitats.	-	Unlikely to occur	Unlikely to occur
<i>Macroderma gigas</i> Ghost Bat	Vulnerable	Vulnerable			•					Occurs in a broad range of habitats, with their distribution being influenced by the availability of suitable caves and mines for roost sites	-	Unlikely to occur	Unlikely to occur
<i>Ozimops cobourgianus</i> Northern Coastal Free-tailed Bat	Priority 1							•	•	Associated with mangrove habitat, roost in hollows of those trees. Forage in eucalypt or melaleuca woodlands, and other coastal habitats.	-	Unlikely to occur	Unlikely to occur
AVIFAUNA													
<i>Apus pacificus</i> Pacific Swift	Migratory	Marine; Migratory	•	•			•	•	•	Entirely aerial when in Australia.	✓	Likely to occur	Likely to occur
<i>Pluvialis fulva</i> Pacific Golden Plover	Migratory	Migratory; Marine	•	•	•		•		•	Muddy, rocky and sandy wetlands, saltmarshes, estuaries and lagoons.	-	Unlikely to occur	Unlikely to occur
<i>Pluvialis squatarola</i> Grey Plover	Migratory	Migratory; Marine	•	•	•				•	Almost entirely coastal. Sheltered areas with mudflats and sandflats, occasionally rocky coast. Also occur very occasionally around terrestrial wetlands.	-	Unlikely to occur	Unlikely to occur
<i>Charadrius mongolus</i> Lesser Sand Plover	Endangered; Migratory	Endangered; Migratory; Marine	•	•					•	Coastal and estuarine areas. Can also be found in intertidal sandflats and mudflats, mangroves, brackish swamps or riverbeds.	-	Unlikely to occur	Unlikely to occur
<i>Charadrius leschenaultii</i> Greater Sand Plover	Vulnerable; Migratory	Vulnerable; Migratory; Marine	•		•			•	•	Coastal and estuarine areas. Mainly found on beaches with large intertidal mudflats or sandbanks, as well as estuarine lagoons, saltlakes or swamps.	-	Unlikely to occur	Unlikely to occur
<i>Charadrius veredus</i> Oriental Plover	Migratory	Migratory; Marine	•	•				•	•	Estuarine mudflats, sandbanks, beaches or reefs, and grasslands immediately after migration. Thereafter- flat, open, semi-arid or arid grasslands interspersed with hard, bare ground (claypans, paddocks, lawns, recently burnt areas), lightly wooded grasslands.	✓	May occur	May occur
<i>Rostratula australis</i> Australian Painted-snipe	Endangered	Endangered	•	•	•			•	•	Shallow, terrestrial freshwater wetlands (temporary and permanent lakes, swamps, claypans), inundated	-	May occur	May occur

										grassland or saltmarsh and dams. Often includes tussocks of grass, sedges, rushes or reeds, or samphire. Breeding: shallow wetlands with areas of bare wet mud and both upper and canopy cover.			
<i>Numenius phaeopus</i> Eurasian Whimbrel	Migratory	Migratory; Marine	•	•	•				•	Intertidal mudflats of sheltered coasts, mangroves, unvegetated mudflats.	-	Unlikely to occur	Unlikely to occur
<i>Numenius minutus</i> Little Curlew	Migratory	Migratory; Marine	•	•					•	Pools, river beds, tidal channels. Prefers pools with bare dry mud, but do not use pools if they are totally dry, flooded, or heavily vegetated.	-	Unlikely to occur	Unlikely to occur
<i>Numenius madagascariensis</i> Far Eastern Curlew	Critically Endangered; Migratory	Critically Endangered; Migratory; Marine	•	•			•	•	•	Sheltered coasts, estuaries and coastal lagoons with large intertidal mudflats.	-	Unlikely to occur	Unlikely to occur
<i>Limosa lapponica</i> Bar-tailed Godwit	Critically Endangered (ssp. menzbieri); Vulnerable (ssp. baueri); Migratory	Endangered (ssp. menzbieri); Vulnerable (ssp. baueri); Migratory; Marine	•	•	•				•	Estuarine mudflats, beaches and mangroves. Found in coastal areas.	-	Unlikely to occur	Unlikely to occur
<i>Limosa limosa</i> Black-tailed Godwit	Migratory	Migratory; Marine	•	•			•	•	•	Primarily coastal, found in sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats. Also found in sparsely vegetated, shallow, near-coastal wetlands.	-	Unlikely to occur	Unlikely to occur
<i>Arenaria interpres</i> Ruddy Turnstone	Migratory	Migratory; Marine	•	•			•	•	•	Mainly found on exposed rocks and reefs with shallow pools, or on beaches. Also found on mudflats.	-	Unlikely to occur	Unlikely to occur
<i>Calidris tenuirostris</i> Great Knot	Critically Endangered; Migratory	Critically Endangered; Migratory; Marine	•	•					•	Sheltered coastal habitats with large intertidal mudflats or sandflats.	-	Unlikely to occur	Unlikely to occur
<i>Calidris canutus rogersi</i> Red Knot (rogersi)	Endangered; Migratory	Endangered; Migratory; Marine	•	•					•	Coastal sandy estuaries, muddy tidal flats.	-	Unlikely to occur	Unlikely to occur
<i>Calidris acuminata</i> Sharp-tailed Sandpiper	Migratory	Migratory; Marine	•						•	Muddy edges of shallow fresh or brackish wetlands with inundated or emergent low vegetation including sedges, saltmarsh or grass. Includes swamps, lakes, dams, salt pans, hypersaline salt lakes, saltworks, sewage dams, and flooded paddocks.	-	Unlikely to occur	Unlikely to occur
<i>Calidris ferruginea</i> Curlew Sandpiper	Critically Endangered; Migratory	Critically Endangered; Migratory; Marine	•	•			•	•	•	Intertidal mudflats in sheltered coastal areas (estuaries, bays, inlets and lagoons), non-tidal swamps, lakes and lagoons near the coast, inland around ephemeral and permanent lakes, dams, waterholes and bore drains with bare edges of mud or sand. Fresh or brackish waters.	-	Unlikely to occur	Unlikely to occur
<i>Calidris subminuta</i> Long-toed Stint	Migratory	Migratory; Marine	•	•			•		•	Shallow freshwater or brackish wetlands including lakes and swamps.	-	Unlikely to occur	Unlikely to occur
<i>Calidris ruficollis</i> Red-necked Stint	Migratory	Migratory; Marine	•	•			•		•	Coastal, sheltered inlets, estuaries, intertidal mudflats and protected shores. May also be found in shallow wetlands.	-	Unlikely to occur	Unlikely to occur
<i>Calidris alba</i> Sanderling	Migratory	Migratory; Marine	•	•					•	Open sandy beaches, roosting on bare sand in dunes.	-	Unlikely to occur	Unlikely to occur
<i>Calidris melanotos</i> Pectoral Sandpiper	Migratory	Migratory; Marine	•	•				•	•	Shallow fresh to saline wetlands. Coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. When found inland, generally in wetlands that have open fringing mudflats and low, emergent or fringing vegetation.	-	Unlikely to occur	Unlikely to occur

<i>Limnodromus semipalmatus</i> Asian Dowitcher	Migratory		•	•					•	Grassy wetlands along coasts.	-	Unlikely to occur	Unlikely to occur
<i>Xenus cinereus</i> Terek Sandpiper	Migratory	Migratory; Marine	•	•			•	•	•	Intertidal mudflats, sheltered estuaries, mudbanks and mangroves..	-	Unlikely to occur	Unlikely to occur
<i>Actitis hypoleucos</i> Common Sandpiper	Migratory	Migratory; Marine	•	•			•		•	Wide range of coastal and inland wetlands mostly found around muddy margins (narrow, steep) or rocky shores (rarely mudflats). Often associated with mangroves.	-	Unlikely to occur	Unlikely to occur
<i>Tringa brevipes</i> Grey-tailed Tattler	Migratory; Priority 4	Migratory	•	•			•	•	•	Sheltered coasts with reefs or rock platforms, or intertidal mudflats.	-	Unlikely to occur	Unlikely to occur
<i>Tringa stagnatilis</i> Marsh Sandpiper	Migratory	Migratory; Marine	•	•			•	•	•	Permanent or ephemeral wetlands, intertidal mudflats, shallow freshwater lakes.	-	Unlikely to occur	Unlikely to occur
<i>Tringa glareola</i> Wood Sandpiper	Migratory	Migratory; Marine	•	•					•	Well-vegetated, shallow, freshwater wetlands such as swamps, dominated by taller fringing vegetation, especially Melaleuca and Red River Gums. Inundated grasslands and wooded floodplains where floodwaters are temporary or receding, drying wetlands.	-	Unlikely to occur	Unlikely to occur
<i>Tringa nebularia</i> Common Greenshank	Migratory	Migratory; Marine	•	•			•	•	•	Edges of wetlands, mudflats, channels, shallow edges around water, shallow pools, puddles, slightly elevated rocks, sandbanks and muddy islets.	-	Unlikely to occur	Unlikely to occur
<i>Glareola maldivarum</i> Oriental Pratincole	Migratory	Migratory	•	•				•		Open plains, floodplains, short grassland. Often near terrestrial wetlands or along the coast.	-	May occur	May occur
<i>Anous stolidus</i> Brown Noddy	Migratory	Migratory; Marine			•					Occurs near islands on rocky islets and stacks with precipitous cliffs.	-	Unlikely to occur	Unlikely to occur
<i>Gelochelidon nilotica</i> [Common] Gull-billed Tern	Migratory	Migratory; Marine	•	•	•					Freshwater swamps, beaches and estuarine mudflats.	-	Unlikely to occur	Unlikely to occur
<i>Hydroprogne caspia</i> Caspian Tern	Migratory	Migratory	•	•	•					Sheltered coastal embayments, and near-coastal wetlands (especially lakes and rivers).	-	Unlikely to occur	Unlikely to occur
<i>Thalasseus bergii</i> Greater Crested Tern	Migratory	Migratory; Marine	•	•						Occurs along coasts and estuaries.	-	Unlikely to occur	Unlikely to occur
<i>Sternula albifrons</i> Little Tern	Migratory	Migratory; Marine	•							Almost exclusively coastal, preferring sheltered environments. May be found inland along rivers.	-	Unlikely to occur	Unlikely to occur
<i>Sternula nereis</i> Fairy Tern	Vulnerable	Vulnerable	•	•			•			Sheltered sandy beaches, nesting above the high tide line. Also found in estuaries, wetlands and mainland coast lines.	-	Unlikely to occur	Unlikely to occur
<i>Onychoprion anaethetus</i> Bridled Tern	Migratory	Migratory			•					Rarely found in inshore continental waters and along mainland coastlines, except during breeding in south-western Western Australia.	-	Would not occur	Would not occur
<i>Sterna dougallii</i> Roseate Tern	Migratory	Migratory; Marine	•	•	•					Rocky and sandy beaches, rarely occurring in inshore waters or near the mainland.	-	Would not occur	Would not occur
<i>Sterna hirundo</i> Common Tern	Migratory	Migratory; Marine		•	•					Recorded in all marine zones, commonly observed in near-coastal waters including ocean beaches and estuarine shores. Occasionally recorded in coastal and near-coastal wetlands.	-	Unlikely to occur	Unlikely to occur
<i>Chlidonias leucopterus</i> White-winged Tern	Migratory	Migratory; Marine	•	•	•					Coastal, subcoastal, or terrestrial wetlands.	-	Unlikely to occur	Unlikely to occur
<i>Stercorarius parasiticus</i> Parasitic Jaeger	Migratory	Migratory; Marine	•	•	•					Open ocean.	-	Would not occur	Would not occur
<i>Oceanites oceanicus</i> Wilson's Storm Petrel	Migratory	Migratory; Marine			•					Open ocean.	-	Would not occur	Would not occur

<i>Thalassarche carteri</i> Indian Yellow-nosed Albatross	Endangered; Migratory	Vulnerable; Migratory; Marine	•	•						Open ocean.	-	Would not occur	Would not occur
<i>Macronectes giganteus</i> Southern Giant Petrel	Migratory	Endangered; Migratory; Marine	•	•						Open ocean.	-	Would not occur	Would not occur
<i>Calonectris leucomelas</i> Streaked Shearwater	Migratory	Migratory; Marine	•	•						Open ocean.	-	Would not occur	Would not occur
<i>Ardenna pacifica</i> Wedge-tailed Shearwater	Migratory	Migratory	•	•	•		•			Offshore islands.	-	Would not occur	Would not occur
<i>Ardenna carneipes</i> Flesh-footed Shearwater	Vulnerable; Migratory	Migratory			•					Open ocean, occasionally inshore waters.	-	Would not occur	Would not occur
<i>Fregata ariel</i> Lesser Frigatebird	Migratory	Migratory; Marine	•	•						Open ocean.	-	Would not occur	Would not occur
<i>Sula leucogaster</i> Brown Booby	Migratory	Migratory; Marine			•					Open waters and islands, sometimes seen in inshore waters and coastlines.	-	Would not occur	Would not occur
<i>Plegadis falcinellus</i> Glossy Ibis	Migratory	Migratory; Marine	•							Freshwater marshes at the edges of lakes and rivers, occasionally found in coastal areas such as estuaries and saltmarshes.	-	Unlikely to occur	Unlikely to occur
<i>Pandion cristatus</i> Eastern Osprey	Migratory	Migratory; Marine			•					Coastal and terrestrial wetlands, occasionally found along rivers.	-	Unlikely to occur	Unlikely to occur
<i>Elanus scriptus</i> Letter-winged Kite	Priority 4		•	•	•					Open country and grasslands in arid and semi-arid areas. Found near tree-lined streams or water courses.	✓	May occur	May occur
<i>Falco hypoleucos</i> Grey Falcon	Vulnerable	Vulnerable	•	•						Lightly wooded plains and along major watercourses	-	Unlikely to occur	Unlikely to occur
<i>Falco peregrinus</i> Peregrine Falcon	Other Specially Protected Fauna		•	•	•		•			Forest, woodlands, wetlands and open country	✓	May occur	May occur
<i>Pezoporus occidentalis</i> Night Parrot	Critically Endangered	Endangered	•	•						(Highly cryptic) Remote arid and semi-arid areas. Roosting and nesting in clumps of dense vegetation (primarily old and large spinifex clumps) that is naturally fragmented and therefore protected from fire. Grasslands, shrublands, scattered trees and shrubs, Mulga woodland.	-	Would not occur	Would not occur
<i>Hirundo rustica</i> Barn Swallow	Migratory	Migratory	•	•						Open country in coastal lowlands, often near water, towns and cities. Seen on overhead wires, freshwater wetlands, Melaleuca wetlands, mesophyll shrub thickets and tussock grassland.	✓	May occur	May occur
<i>Motacilla tschutschensis</i> Eastern Yellow Wagtail	Migratory	Migratory; Marine	•	•						Wet meadows, marshland, grassy and muddy lakeshores, fields, often near livestock, shrubland, grassland, and wetlands.	-	Unlikely to occur	Unlikely to occur
<i>Motacilla cinerea</i> Grey Wagtail	Migratory	Migratory; Marine	•							Flowing water, rocky or surrogate rocky habitat, mountain streams, weirs, inland wetlands, grassland, forested areas, and lowland water courses.	-	Unlikely to occur	Unlikely to occur

Appendix 5

Vegetation Structural Classes and Condition Scale



Vegetation Structural Classes*

Stratum	Canopy Cover (%)				
	70-100%	30-70%	10-30%	2-10%	<2%
Trees over 30 m	Tall closed forest	Tall open forest	Tall woodland	Tall open woodland	Scattered tall trees
Trees 10-30 m	Closed forest	Open forest	Woodland	Open woodland	Scattered trees
Trees under 10 m	Low closed forest	Low open forest	Low woodland	Low open woodland	Scattered low trees
Shrubs over 2 m	Tall closed scrub	Tall open scrub	Tall shrubland	Tall open shrubland	Scattered tall shrubs
Shrubs 1-2 m	Closed heath	Open heath	Shrubland	Open shrubland	Scattered shrubs
Shrubs under 1 m	Low closed heath	Low open heath	Low shrubland	Low open shrubland	Scattered low shrubs
Hummock grasses	Closed hummock grassland	Hummock grassland	Open hummock grassland	Very open hummock grassland	Scattered hummock grasses
Grasses, Sedges, Herbs	Closed tussock grassland / bunch grassland / sedgeland / herbland	Tussock grassland / bunch grassland / sedgeland / herbland	Open tussock grassland / bunch grassland / sedgeland / herbland	Very open tussock grassland / bunch grassland / sedgeland / herbland	Scattered tussock grasses / bunch grasses / sedges / herbs

* Based on Muir (1977), and Aplin's (1979) modification of the vegetation classification system of Specht (1970): Aplin T.E.H. (1979). The Flora. Chapter 3 In O'Brien, B.J. (ed.) (1979). *Environment and Science*. University of Western Australia Press; Muir B.G. (1977). Biological Survey of the Western Australian Wheatbelt. Part II: Vegetation and habitat of Bendering Reserve. *Records of the Western Australian Museum*, Suppl. No. 3; Specht R.L. (1970). Vegetation. In: *The Australian Environment*. 4th edn (Ed. G.W. Leeper). Melbourne.

Vegetation Condition Scale*

<p>E = Excellent (=Pristine of BushForever)</p> <p>Pristine or nearly so; no obvious signs of damage caused by the activities of European man.</p>
<p>VG = Very Good (= Excellent of BushForever)</p> <p>Some relatively slight signs of damage caused by the activities of European man. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds such as *<i>Sonchus oleraceus</i> or *<i>Cucumis</i> spp., or occasional vehicle tracks.</p>
<p>G = Good (= Very Good of BushForever)</p> <p>More obvious signs of damage caused by the activities of European man, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or by selective logging. Weeds as above, possibly plus some more aggressive ones such as *<i>Cenchrus</i> spp.</p>
<p>P = Poor (= Good of BushForever)</p> <p>Still retains basic vegetation structure or ability to regenerate to it after very obvious impacts of activities of European man, such as grazing, partial clearing (chaining) or frequent fires. Weeds as above, probably plus some more aggressive ones such as *<i>Cenchrus</i> spp.</p>
<p>D = Degraded (= Degraded of BushForever)</p> <p>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 including very aggressive species such as *<i>Prosopis</i> spp.</p>
<p>D = Completely Degraded (= Completely Degraded of BushForever)</p> <p>Areas that are completely or almost completely without native species in the structure of their vegetation; ie. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.</p>

* Based on Trudgen M.E. (1988). A Report on the Flora and Vegetation of the Port Kennedy Area. Unpublished report prepared for Bowman Bishaw and Associates, West Perth.

Appendix 6

Site Data (incl. Species List)



OSPL 2021
Described by RWMG **Date** 8/26/2021 **Site** POT01 **Type** R 50 x 50m
MGA Zone 50 **303863 mE** **7605366 mN**
Habitat Undulating plain. Base of low coastal dune.
Soil Sand, some loam. No rocks present.
Vegetation *Triodia epactia* very open hummock grassland over **Cenchrus ciliaris*, (**C. setiger*) tussock grassland over *Ipomoea costata*, **Aerva javanica* very open herbland.
Veg Condition Poor - Degraded. High cover of **Cenchrus* spp., low cover of **Aerva javanica* and presence of **Tribulus terrestris*. Previously disturbed, some erosion.
Fire Age No sign of recent fire.
Notes Weeds and rubbish present. Previously disturbed. Erosion at boundary of area. Fauna: two *Ctenotus menetia* and one dragon (*Isolepis* spp.) sighted. No significant fauna habitat present.

SPECIES LIST:

Name	Cover (%)	Height (cm)	Specimen	Notes
<i>Abutilon</i> sp. Pritzelianum (S. van Leeuwen 5095)	0.1	165	POT01-04	N=35 (25 adults, 10 juveniles)
<i>Acacia coriacea</i> subsp. <i>coriacea</i>	0.1	200		
<i>Acacia stellaticeps</i>	0.1	120		
<i>*Aerva javanica</i>	1.5	60		N=50
<i>Aristida holathera</i> var. <i>holathera</i>	0.1	25		
<i>*Cenchrus ciliaris</i>	35	40		
<i>*Cenchrus setiger</i>	10	40		
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	0.1	60		
<i>Indigofera colutea</i>	0.1	20		
<i>Indigofera monophylla</i>	0.1	30	POT01-01	
<i>Ipomoea costata</i>	2	20		
<i>Rhagodia eremaea</i>	0.1	110	POT01-03	
<i>Salsola australis</i>	1	60		
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.1	120	POT01-02	
<i>*Tribulus terrestris</i>	0.1	20		
<i>Trichodesma zeylanicum</i> var. <i>grandiflorum</i>	0.1	130		
<i>Triodia epactia</i>	3	30		

* denotes a weed species

