Horizon Power

Learmonth Line Rebuild

Clearing Permit Supporting Report

61-35749-00013-EN-RPT-001

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Table of contents

Table index

Appendices

1. Introduction

1.1 Background

Horizon Power is proposing to rebuild the Learmonth (Exmouth) Line adjacent to the existing line that extends from the Exmouth townsite south to RAAF Learmonth in Western Australia (Figure 1, Appendix A). The construction of this new line is likely to be considered new infrastructure and therefore may require approvals under Commonwealth and State Legislation.

1.2 Purpose

GHD was commissioned by Horizon Power to prepare a Clearing Permit Supporting Report for the proposed Learmonth Line re-build. The purpose of this report, on the basis of desktop studies, is to identify the major environmental issues in relation to construction of the line and undertaken an assessment of the proposed Project against the Ten Clearing Principles.

1.3 Scope of works

The GHD scope of works for this project included desktop searches of publically available, relevant literature and databases and the preparation of this report.

1.4 Relevant legislation requirements

Key Commonwealth and Western Australian environmental legislation that may be relevant to the Project is outlined in Table 1. This PEIA identifies (but does not apply for) additional clearances required under legislative requirements, including those required under the following Acts. An overview of key legislation and guidelines, conservation codes and background information relevant to this project is provided in Appendix B.

Table 1 Key environmental legislation relevant to the project

Legislation	Responsible agency	Aspect
Commonwealth legislation		
Environment Protection and Biodiversity Conservation Act 1999	Department of the Environment and Energy (DEE)	Matters of National Environmental Significance including threatened flora and fauna
State legislation		
Biosecurity and Agricultural Management Act 2007	Department of Primary Industries and Regional Development (DPIRD)	Weeds and feral animals
Conservation and Land Management Act 1984	Department of Biodiversity, Conservation and Attractions (DBCA)	Use, protection and management of public lands and waters and its flora and fauna
Contaminated Sites Act 2003	Department of Water and Environment Regulation (DWER)	Management of contaminated sites
Environmental Protection Act 1986	Environmental Protection Authority (EPA) (Part IV) DWER (Part V)	Environmental impact assessment and management
Environmental Protection (Noise) Regulations 1997	DWER	Noise standards

Legislation	Responsible agency	Aspect
Environmental Protection (Clearing of Native Vegetation) Regulations 2004	DWER	Clearing of native vegetation
Land Administration Act 1997	DPIRD	Administration of State Land
Rights in Water and Irrigation Act 1914	DWER	Access to and use of water resources; protection and management of river flows and drainage
Soil and Land Conservation Act 1945	DPIRD	Protection of soil and prevention/management of soil erosion
Wildlife Conservation Act 1950	DBCA	Protection of native wildlife

1.5 Limitations and assumptions

This report has been prepared by GHD for Horizon Power and may only be used and relied on by Horizon Power for the purpose agreed between GHD and the Horizon Power as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Horizon Power arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Horizon Power and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Description of project

2.1 Project description

The existing Learmonth Line extends from near Welch Street in Exmouth, south to RAAF Learmonth and was installed prior to the establishment of Horizon Power. The Learmonth Line has been identified as potentially non-compliant with current Western Australian standards, in particular the overhead conductor clearance. In order to improve quality and compliance, two options are being considered for the Learmonth Line:

1. Improving the existing line – this option would involve maintenance along the line including replacement of poles at the existing locations and/or installing additional poles within existing spans at a greater height to raise the clearance level of the overhead conductor. This option would include vegetation clearing and require backup generation as the line would need to be systematically de-energised to allow maintenance works to be undertaken.
2. Rebuilding the existing line – this option would include rebuilding a new line adjacent to the existing line compliant with current West Australian standards. This option would require vegetation clearing along the length of the line for construction and ongoing operational maintenance. There would be no disruption to power supply and reliability during the construction, and at completion, the existing line would be decommissioned and removed.

This report considers environmental issues and impacts associated with rebuilding the existing Learmonth Line (option 2) only. Whilst detailed design has not been completed, the project is likely to include:

- Installation of Hayman steel poles approximately 14 m tall at standard embedment depth of 2 m. The poles would be installed at approximately 100 m spans along the length of the proposed alignment.
- Standard construction techniques as per Horizon Power construction standards, including poles to be dressed while laying on ground then stood, and installed.
- A 12 m wide corridor along the length of the proposed alignment for construction and ongoing operational maintenance.
- Removal of vegetation using a combination of hand disturbance and mechanical means (e.g. front end loader, grader)
- Presence of standard equipment during construction including both light vehicles and heavy vehicles such as cranes and pole borer.

2.2 Project footprint

The proposed Learmonth Line (hereon referred to as the ‘project footprint’) will extend from near Welch Street in Exmouth, south to RAAF Learmonth, adjacent to (approximately 15 m from) the existing line. The project footprint is approximately 31 kilometres (km) long, up to 50 m wide and includes eight T-off areas. The project footprint covers 157.89 hectares (ha) and is mapped in Figure 1, Appendix A.

3. Methodology

A desktop assessment of the project footprint and the potential constraints of the proposed works was undertaken by viewing GIS spatial files and reviewing relevant reports and publically available, government managed databases. The information sources utilised in this assessment are presented in Table 2.

Table 2 Information sources

Aspect	Information Source
Climate	Bureau of Meteorology Climate Data Online (BoM 2017)
Geology, landform and soils	Soil landscapes (Tille 2006)
Acid Sulphate Soils	Australian Soil Resources Information System (ASRIS 2017)
Land use and reserves	DBCA Estate spatial dataset Shire of Exmouth Town Planning Scheme No. 3
Environmentally Sensitive Areas	DWER Clearing Permit System (DWER 2017a)
Vegetation	Beard vegetation mapping (1976) Statewide Vegetation Statistics (Government of Western Australia (GoWA) 2018)
Threatened and Priority Ecological Communities	DBCA Threatened Ecological Community (TEC) and Priority Ecological Community (PEC) spatial dataset
Conservation Significant Flora and Fauna	DBCA *NatureMap* database (DBCA 2007–) DBCA Threatened and Priority Fauna database (TPFL) Western Australian Herbarium database (WAHERB) Woodman Environmental Consulting (2013)
Surface water and groundwater	GoWA Data Layers (2017) Water and Rivers Commission (1999) Directory of Important Wetlands in Australia (DEE 2017b)
Contaminated sites	DWER Contaminated Sites Database (DWER 2017b)
Matters of National Environmental Significance (MNES)	EPBC Act Protected Matters Search Tool (DEE 2017a)

4. Assessment of desktop environmental aspects and impacts

4.1 Physical environment

4.1.1 Climate

The project is located in the north-west of Western Australia and experiences a semi-desert climate with warm to hot temperatures and low summer and winter rainfall. Cyclones occur in the area and mid-latitude depressions cause peaks and falls in climate in both summer and winter. The closest meteorological recording station is located at Learmonth (No. 005007) approximately 1.7 km west of the project footprint. Climatic data from this station indicates the mean maximum temperature ranges from 37.9 °C in January to 24.2 °C in July. The mean minimum temperature ranges from 24.1 °C in February to 11.5 °C in July. The mean annual rainfall is 264 mm with an average of 25 rain days a year (BoM 2017).

4.1.2 Geology, landforms and soils

The project is located in the Cape Giralia Coastal Zone of the Exmouth Province. The Exmouth Province mostly sits over the sedimentary rocks of the Carnarvon Basin. To the west of Exmouth Gulf, the Tertiary limestone of the Cape Range Group is found on top of the Triassic-Jurassic sediments of the Exmouth Sub-basin (Tille 2006).

The Cape Giralia Coastal Zone is based on the Giralia Anticline geomorphic province and a combination of the Cape Range, Coastal Dunes, Giralia Range and (western) Winning Plains geomorphic districts. The Zone is described as sandy plains, alluvial plains and hills and ranges (with some stony plains) on Cainozoic deposits and marine limestone over sedimentary rocks of the Carnarvon Basin. Soils include red deep sands and red loamy earths with some shallow calcareous loams, red/brown non-cracking clays and stony soils (Tille 2006).

A unique feature of the Cape Range peninsula is the karst environment. Karst landscapes are terrain with distinctive landforms and drainage patters arising from the high solubility of limestone in natural waters. In the Cape Range area some of the pure and friable limestone has undergone extensive solution with caves and large solution openings having developed (Water and Rivers Commission 1999).

4.1.3 Acid sulfate soils

A review of the ASRIS risk mapping (ASRIS 2017) indicates that the project footprint is located within an area that has an extremely low probability of occurrence of acid sulfate soils (ASS) (1-5 per cent chance of occurrence within small localised areas) with a very low degree of confidence. There is one small area near Shothole Canyon Road that is mapped as having a high probability of occurrence of ASS (>70 % chance of occurrence) with a very low degree of confidence.

4.1.4 Contaminated sites

There are no known contaminated sites within the project footprint. There are a number of known contaminated sites within the vicinity of the project footprint, located within the township of Exmouth. No impacts to known contaminated sites are anticipated from project works.

4.1.5 Potential impacts

The project will potentially result in impacts to the physical environment. These impacts are expected to occur during the construction phase and include:

- Risk of water and wind erosion as a consequence of construction works. Vegetation clearing and excavation in areas with lighter-texture soils (e.g. sandy soils) are likely to be vulnerable to water and wind erosion. Areas dominated by dispersive soils (e.g. clay soils) may also be prone to water erosion, particularly during high intensity rainfall events.
- Undisturbed ASS do not pose a risk, and only become an issue where excavation occurs. The need for ASS investigations is considered unlikely, however, dependent on the ongoing construction requirements for the project.

4.2 Land use

4.2.1 Land vesting

The project largely occurs within land zoned as recreation and open space, with the remaining parts of the project zoned as residential and public purpose according to the Shire of Exmouth Town Planning Scheme No. 3 (Figure 2, Appendix A). The closest sensitive receptors include private residential housing (approximately 25 m east of the project footprint) located south of the township of Exmouth.

4.2.2 Land use

The project footprint is located within the Shire of Exmouth, largely within Crown Lease. The project footprint also intersects Unallocated Crown Land and Crown Reserve, with a small portion adjacent to/intersecting Commonwealth Government Land associated with RAAF Learmonth. The project footprint is directly adjacent to the existing Learmonth transmission line.

4.2.3 Conservation reserves and areas

No DBCA managed lands intersect the project footprint. There are two conservation reserves within 10 km of the project footprint, these include Unallocated Crown Land – Department Interest and Cape Range National Park (R 27288, Class A). Both areas are located west of the project footprint (Figure 3, Appendix A).

4.2.4 Environmentally Sensitive Areas

One Environmentally Sensitive Area (ESA) intersects the project footprint. This ESA covers the entire Cape Range peninsula (Figure 3, Appendix A).

4.2.5 Potential impacts

Land use

The project is unlikely to result in impacts to the surrounding land use. The proposed project involves the re-build of the Learmonth transmission line adjacent to the existing line, and as such the project is unlikely to result in a change in existing site conditions.

Surrounding conservation reserves and ESAs

The project will not directly impact on any conservation areas. It is anticipated that standard management practices will be implemented during construction through a project-specific Environmental Management Plan (EMP) to mitigate aspects that have the potential to cause indirect impacts on nearby conservation areas, such as contamination through hydrocarbon spills and weed spread.

The project will directly impact on an ESA associated with the entire Cape Range peninsula.

4.3 Hydrology

Desktop searches of the GoWA data layers identified the water resource aspects present in the project footprint. These are detailed below in Table 3.

Table 3 Water resource aspects within the project footprint

Aspect	Details	Result
Groundwater Areas	Groundwater areas proclaimed under the RIWI Act	Gascoyne Groundwater Area
Surface Water Areas	Surface water areas proclaimed under the RIWI Act	Pilbara Surface Water Area
Irrigation District	Irrigation Districts proclaimed under the RIWI Act	None present
Rivers	Rivers proclaimed under the Rights in RIWI Act	None present
Public Drinking Water Source Areas (PDWSA)	PDWSA is a collective term used for the description of Water Reserves, Catchment Areas and Underground Pollution Control Areas declared (gazetted) under the provisions of the *Metropolitan Water Supply, Sewage and Drainage Act 1909* or the *Country Area Water Supply Act 1947* (CAWS Act).	Exmouth Water Reserve (Priority 1)
Waterways Management Areas	Areas proclaimed under the *Waterway Conservation Act 1976*	None present

4.3.1 Groundwater and hydrogeology

The project is underlain by the Cape Range Group (unconfined) and Birdrong Sandstone (confined) aquifers. The Cape Range Group comprises the Trealla, Tulki and Mandu Limestone karst environment. The aquifer has a thin freshwater lens contained in the limestone over saline water. Groundwater levels are only marginally above sea level and flow direction is from the Cape Range anticline out to the sea, from west to east on the eastern side of the range (Water and Rivers Commission 1999).

Recharge to the unconfined aquifer is mainly by direct infiltration of rainfall. Indirect recharge occurs through the beds of ephemeral streams which carry storm runoff from the Cape Range. Groundwater is discharged by abstraction from the wellfield, by evapotranspiration from vegetation on the coastal plain and by flow to the ocean and several springs along the coast (Water and Rivers Commission 1999).

Groundwater salinity is generally 400-600 mg/L Total Dissolved Solids (TDS) immediately east of the Cape Range anticline, increasing eastwards towards the saltwater interface. On a local scale water quality is fresh to saline depending on depth and location (Water and Rivers Commission 1999).

The Birdrong Sandstone aquifer is a fine to coarse friable sandstone about 30 m thick. The aquifer is found at depths of 1000 m or greater and contains saline water (Water and Rivers Commission 1999).

4.3.2 Surface water and drainage

There are numerous minor drainage lines that intersect or occur adjacent to the project footprint. There are several larger drainage lines that intersect the project footprint including Mowbowra

Creek and an unnamed Creek near Shothole Canyon Road. Both of these drainage lines are ephemeral (Figure 4, Appendix A).

4.3.3 Wetlands

One Nationally Important Wetland, the Cape Range Subterranean Waterways, intersects the project footprint in the vicinity of Mowbowra Creek (Figure 4, Appendix A). This wetland is characterised by subterranean waterways and crevicular system in karstic limestone and coastal limestones, and is accessible through anchialine pools, wells, bores and caves. The wetland meets five of the six criteria for nationally important wetlands in Australia, including playing an important ecological role and supporting endemic stygofauna such as the Blind Gudgeon (*Milyeringa veritas*), the Blind Cave Eel (*Ophisternon candidum*) and the only southern hemisphere representatives of entire classes, orders, families and genera of crustaceans (DEE 2017b).

4.3.4 Potential impacts

The project may cause disturbance to karst environments and groundwater, or interruption to the natural drainage and surface run-off patterns, which may result in run-off to watercourses that could lead to contamination or sedimentation of downstream aquatic ecosystems.

Potential impacts to hydrology include:

- Groundwater – the project footprint is located within the proclaimed Gascoyne Groundwater Area. Should groundwater be needed (taken) or a well/bore constructed/ altered, a licence from DWER may be required. Project excavations may impact karst environments and/or groundwater quality.
- Surface water – the project footprint is located within the proclaimed Pilbara Surface Water Area. Should water be needed (taken) or diverted from a drainage line or wetland, a permit from DWER will be required. A number of minor drainage lines intersect or occur adjacent to the project footprint, as well as two larger creeks. Section 49 of the *Energy Operators Powers Act 1979* is sufficient to authorise Horizon Power to interfere with bed and banks of these drainage lines/creeks for the purpose of a broad range of activities undertaken within the purpose of establishing new power supply systems or maintaining existing power supply systems. Furthermore, it is anticipated that the surface water hydrology can be maintained in its current regime with appropriate drainage design.

  The project footprint intersects the Cape Range Subterranean Waterways (Nationally Important Wetland). Project excavations may impact upon this wetland. Consideration should be given to drainage design and management to ensure the existing hydrological regime can be maintained.
- Erosion/sedimentation – during the construction phase and for any permanently cleared areas there is the potential for erosion and sedimentation. This is likely to be more pronounced in current drainage areas.
- Pollution impacts – the storage and handling of chemicals and hydrocarbons (during the construction phase) will require management to prevent pollution of soil and drainage lines.

It is anticipated that standard management practices will be implemented during construction to through a project-specific EMP to mitigate aspects that have the potential to cause direct and indirect impacts on hydrology.

4.4 Vegetation and flora

4.4.1 Regional biogeography

The project is located in the Carnarvon bioregion and Cape Range subregion as described by the Interim Biogeographic Regionalisation of Australia (IBRA).

The Carnarvon bioregion is composed of quaternary alluvial, aeolian and marine sediments overlying Cretaceous strata. A mosaic of saline alluvial plains with samphire and saltbush low shrublands, Bowgada low woodland on sandy ridges and plains, Snakewood scrub on clay flats, and tree to shrub steppe over hummock grasslands on and between red sand dune fields. Limestone strata with *Acacia stuartii* or *A. bivenosa* shrubland outcrop in the north, where extensive tidal flats in sheltered embayments support mangal (Kendrick and Mau 2002).

4.4.2 Broad vegetation mapping and extent

Broad scale (1:250,000) pre-European vegetation mapping of the area was completed by Beard (1976) at an association level. The mapping indicates that two vegetation associations are present within the project footprint, these are:

- Shrublands; snakewood scrub (association 162)
- Hummock grasslands, shrub steppe; waterwood over soft spinifex (association 663).

The pre-European mapping has been adapted and digitised by Shepherd *et al.* (2002). The extent of vegetation associations have been determined by the state-wide vegetation remaining extent calculations maintained by DBCA (latest update December 2017 – GoWA 2018). As shown in Table 4, the current extents remaining of vegetation associations 162 and 663 at the State, IBRA bioregion, IBRA subregion and Local Government Area (LGA) levels are greater than 85 % of their calculated pre European extents, with the exception of association 162 which has 38.22 % of its current extent remaining within the Shire of Exmouth.

Table 4 Extent of pre-European vegetation associations mapped with the project footprint (Beard 1975, GoWA 2018)

Vegetation association	Scale	Pre-European extent (ha)	Current extent (ha)	Remaining (%)	% Current extent in all DBCA-managed land (proportion of current extent)
162	State: Western Australia	547,312.10	545,772.34	99.72	26.15
	IBRA bioregion: Carnarvon	218,936.66	217,754.85	99.46	65.50
	IBRA sub-region: Cape Range	27,287.90	26,106.10	95.67	-
	LGA: Shire of Exmouth	2,015.43	770.22	38.22	-
663	State: Western Australia	30,474.41	25,976.66	85.24	28.93
	IBRA bioregion: Carnarvon	29,068.26	25,866.32	88.98	28.66
	IBRA sub-region: Cape Range	29,068.26	25,866.32	88.98	28.66
	LGA: Shire of Exmouth	30,474.41	25,976.66	85.24	28.93

4.4.3 Conservation significant ecological communities

Searches of the EPBC Act PMST and the DBCA TEC/PEC databases identified one TEC within the project footprint, the Camerons Cave Troglobitic Community listed as a Critically Endangered TEC by DBCA.

Camerons Cave troglobitic community (obligatory cave inhabitants) is known only from Camerons Cave on the Cape Range peninsula. The community contains a unique assemblage of species, at least eight of which are known only from this location. The assemblage is related to those in some other caves, however, all species with congeneric members in caves in Cape Range proper have, to date, proved to be distinct species. The assemblage relies on particulate and dissolved sources of organic carbon for food. This food source is allochthonous, that is, comes in from outside the cave at the surface. The community is also reliant on the humid conditions in Camerons Cave, which are created through contact with the water table and specific surface conditions (DEC 2012).

Camerons Cave occurs within the Exmouth townsite, north of Heron Way. The cave is a doline (sinkhole) about 10 m x 15 m in diameter, with a hole in the middle that drops into a horizontal cave that goes down to and beyond the watertable. Camerons Cave has a maximum depth of 17 m and is approximately 65 m long by up to 34 m wide. The roof of the cave is 5 m thick and the cave entrance occurs at an altitude of about 13 m. It is unprotected and the area around the cave is subject to various proposed developments (DEC 2012).

4.4.4 Flora diversity

A search of the *NatureMap* database identified 536 flora taxa, representing 100 families and 268 genera previously recorded within 20 km of the project footprint (Appendix C). This total comprised 505 native flora taxa and 31 naturalised (introduced) flora taxa. Dominant families recorded included Fabaceae (69 taxa), Asteraceae (43 taxa) and Poaceae (39 taxa).

4.4.5 Conservation significant flora

Searches of the EPBC Act PMST, *NatureMap* database and DBCA TPFL and WAHERB databases identified the presence/potential presence of 19 conservation significance flora taxa within a 20 km buffer of the project footprint. The desktop searches recorded:

- Eight Priority 2 taxa
- Nine Priority 3 taxa
- Two Priority 4 taxa

Taxa of conservation significance previously recorded within 20 km of the project footprint are mapped in Figure 5, Appendix A.

Previous desktop and field assessments have been undertaken by Woodman Environmental Consulting (2013) in the Exmouth area as part of the Horizon Power ESA program. These assessments identified the presence of *Tinospora esiangkara* (Priority 2) and *Acacia alexandri* (Priority 3) approximately 184 and 225 m from the existing Learmonth Line (Woodman 2013).

A likelihood of occurrence assessment was conducted for all conservation significant flora taxa identified in the desktop assessment (Appendix D). This assessment took into account previous records and habitat requirements through desktop assessment only. The likelihood of occurrence assessment concluded that seven taxa are likely to occur, 11 taxa may possibly occur, and one taxon is unlikely to occur in the project footprint.

4.4.6 Potential impacts

The project will result in the direct loss of native vegetation as a result of constructing the new transmission line.

The project may result in the following impacts on vegetation and flora:

- Vegetation – the project will require clearing of native vegetation. This will result in a reduction in the extent of native vegetation from the local (Shire of Exmouth) and regional (Carnarvon bioregion) areas. However, any clearing of vegetation for the project is unlikely to result in significant local or regional impacts to the extent or type in the area.
- TECs – the project intersects the Camerons Cave troglobitic community TEC buffer and is likely to directly impact on this community if excavation or drilling is required in its vicinity. Furthermore, other project activities such as chemical and heavy vehicle use and changes to surface drainage may also indirectly impact this TEC. Horizon Power has sought advice from DBCA is who has provided recommendations for managing and minimising impacts to the Camerons Cave troglobitic community TEC. Consideration to avoid Camerons Cave (where possible) and implementation of DBCA's recommendations should be undertaken in the planning phase of the project.
    1. Recommendation: Where possible, the new poles are positioned to maximise distance from the cave entrance.
    2. Recommendation: The use of potentially harmful chemicals (e.g. insecticides, rust prevention) is avoided within or adjacent to the buffer zone of the TEC.
    3. Recommendation: The use of heavy vehicles within the buffer zone is minimized where possible, and no new road is built within the TEC buffer boundary to minimise any vibrations that might affect the structural integrity of the cave. In addition, if it is possible to rehabilitate the existing access road then it would be recommended to do so.
    4. Recommendation: All areas that are disturbed in the course of the upgrades are re-levelled to ensure surface water flow is maintained and to prevent water from being intercepted and/or channelled along disturbance pathways.
- Flora – the project will require clearing of native vegetation. This may result in the loss of DBCA Priority listed flora which has been recorded in the vicinity of the project footprint.
- Introduction and/or spread of weeds – the project has the potential to contribute to weed introduction and spread into adjacent vegetation. This is not likely to be a significant issue, however, hygiene management will be required to prevent impacts to adjacent vegetation and nearby conservation areas.

Horizon Power has considered DBCA's recommendations in regards to Camerons Cave troglobitic community TEC and will implement these recommendations where possible.

- The proposed project is located further from Camerons Cave TEC than the existing transmission line, and Horizon Power will position new poles as far away from the cave entrance as possible.
- Horizon Power will implement standard chemical storage, handling and spill management practices during construction through a project-specific EMP to mitigate direct and indirect impacts to Camerons Cave TEC from potential contamination.
- An access track along the proposed project will be required, however, the track will be for maintenance only with restricted use. Horizon Power will minimise the use of heavy vehicles within the Camerons Cave TEC buffer zone.

- Horizon Power will implement appropriate drainage design and management to maintain surface water flora and prevent water being intercepted and/or channelled along disturbance pathways.

4.5 Fauna

4.5.1 Fauna habitat

The project footprint intersects native vegetation which provides fauna habitat. It is likely the habitats present within the project footprint are well represented in the local and regional area given the extent of native vegetation adjacent to the project footprint, and in nearby conservation areas.

The project footprint is adjacent to a large contiguous tract of native vegetation that extends west of the project footprint and includes unallocated crown land and the Cape Range National Park.

4.5.2 Fauna diversity

A search of the *NatureMap* database identified 866 fauna species previously recorded within 20 km of the project footprint (Appendix C). This total comprised 183 birds, 95 reptiles, 88 invertebrates, 39 mammals, five amphibians and 456 fish. Of the 866 fauna species previously recorded 857 were native species and nine were naturalised (introduced) species.

4.5.3 Conservation significant fauna

Searches of the EPBC Act PMST and *NatureMap* database identified the presence/potential presence of 60 conservation significance fauna within a 20 km buffer of the project footprint. This total does not include those species that are exclusively marine as no marine habitat is present within the project footprint. The desktop searches recorded:

- Twenty three species listed as Threatened under the EPBC Act and/or as Schedule 1-4 (Threatened) under the WC Act
- Twenty nine species listed as migratory under the EPBC Act and/or as Schedule 5 (Migratory birds protected under an international agreement) under the WC Act
- Eight species listed as Priority by DBCA.

A likelihood of occurrence assessment was conducted for all conservation significant fauna species identified in the desktop assessment (Appendix D). This assessment took into account previous records, species biology and habitat requirements through desktop assessment only. The likelihood of occurrence assessment concluded that 22 species are likely to occur and 38 species are unlikely or highly unlikely to occur within the project footprint. The majority of species considered likely to occur are fish and invertebrate species associated with Camerons Cave.

4.5.4 Potential impacts

The project will result in the direct loss of native vegetation and associated fauna habitat. The project may result in the following impacts on fauna:

- Habitat loss and fragmentation – the project will result in habitat loss through direct clearing of native vegetation. Whilst the project will further fragment fauna habitat, it is unlikely to have a significant impact on local and regional linkages given its location to existing infrastructure and the extent of native vegetation in local and regional areas.

- Death or injury of fauna – fauna injury and death may result from vehicle strikes or fall injuries associated with the construction phase of the project, in particular excavation activities.
- Secondary impacts from noise, dust and vibration during construction. This will temporarily scare fauna away from the construction area but is unlikely to have a permanent impact on fauna.

There is low risk of significant impacts to conservation significant fauna (with the exception of troglobitic and stygobitic fauna) given the extent of clearing and the large tracts of similar habitat in the surrounding area. It is expected that fauna will have adequate adjacent areas to find habitat/refuge if disturbed.

During the construction phase, management should aim to minimise the extent of clearing and injury to/death of fauna. Horizon Power will conduct fauna pre-clearance trapping prior to vegetation clearing.

Horizon Power has considered DBCA's recommendations in regards to Camerons Cave troglobitic community TEC and will implement these recommendations where possible to manage and mitigate impacts to troglobitic and stygobitic fauna.

5. Assessment of vegetation clearing

The clearing of vegetation in Western Australia is regulated by DWER and requires a permit under Part V of the *Environmental Protection Act 1986* (EP Act), except when a project is assessed under Schedule 6 of the Act or is prescribed by regulation in the *Environmental Protection (Clearing Native Vegetation) Regulations 2004* and not in an ESA.

When preparing a native vegetation clearing application, an assessment of the project footprint against the Ten Clearing Principles should be undertaken to inform this process. The Ten Clearing Principles aim to ensure potential impacts resulting from removal of native vegetation can be assessed in an integrated way.

An assessment of the proposed native vegetation clearing within the project footprint against the Ten Clearing Principles was undertaken (Table 5). This assessment concluded the proposed clearing associated with the project may be at variance to Principle (f), Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland. The project is considered unlikely to be at variance to the remaining principles.

Table 5 Assessment of the proposed clearing footprint against the ten clearing principles

Principle	Assessment	Outcome	References
(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.	The survey areas are situated in the Eremaen Botanical Province of Western Australia, within the Carnarvon IBRA bioregion and the Cape Range subregion. The flora of the Cape range subregion is diverse with 980 native vascular flora taxa recorded. A search of the *NatureMap* database identified 536 flora taxa, representing 100 families and 268 genera previously recorded within 20 km of the project footprint. This total comprised 505 native flora taxa and 31 naturalised (introduced) flora taxa. Searches of the EPBC Act PMST, *NatureMap* database and DBCA TPFL and WAHERB databases identified the presence/potential presence of 19 conservation significance flora taxa within a 20 km buffer of the project footprint, which included eight Priority 2, nine Priority 3 and two Priority 4 taxa. Previous desktop and field assessments have been undertaken by Woodman Environmental Consulting (2013) in the Exmouth area as part of the Horizon Power ESA program. These assessments identified the presence of *Tinospora esiangkara* (Priority 2) and *Acacia alexandri* (Priority 3) approximately 184 and 225 m from the existing Learmonth Line (Woodman 2013). A likelihood of occurrence assessment has been conducted for all conservation significant flora taxa identified in the desktop assessment which concluded that seven taxa are likely to occur, 11 taxa may possibly occur, and one taxon is unlikely to occur in the project footprint. The project footprint intersects native vegetation which provides fauna habitat. It is likely the habitats present within the project footprint are well represented in the local and regional area given the extent of native vegetation adjacent to the project footprint, and in nearby conservation areas. A search of the *NatureMap* database identified 866 fauna species (including nine naturalised/introduced species) previously recorded within 20 km of the project footprint. This total comprised 183 birds, 95 reptiles, 88 invertebrates, 39 mammals, five amphibians and 456 fish. Searches of the EPBC Act PMST and *NatureMap* database identified the presence/potential presence of 60 conservation significant fauna	The proposed clearing is unlikely to be at variance to this principle.	Beard (1976) DBCA (2007–) DEE (2017a) GoWA (2017)

Principle	Assessment	Outcome	References
	within a 20 km buffer of the project footprint. This total does not include those species that are exclusively marine as no marine habitat is present within the project footprint. The results identified 23 species listed as Threatened under the EPBC Act and/or Schedule 1-4 (Threatened) under the WC Act, 29 Migratory birds listed under the EPBC Act and/or Schedule 5 of the WC Act, and eight species listed as Priority by the DBCA. A likelihood of occurrence assessment has been conducted for all conservation significant fauna species identified in the desktop assessment which concluded that 22 species are likely to occur and 38 species are unlikely or highly unlikely to occur within the project footprint. The majority of species considered likely to occur are fish and invertebrate species associated with Camerons Cave. The project will result in vegetation and habitat loss through direct clearing of native vegetation. Whilst the project will further fragment fauna habitat, it is unlikely to have a significant impact on local and regional linkages given its location to existing infrastructure and the extent of native vegetation in local and regional areas. The proposed clearing for linear infrastructure is unlikely to impact on the conservation status of conservation significant flora and fauna. The project footprint is unlikely to comprise greater biological diversity than the surrounding areas. Clearing for the project is not likely to be at variance to this Principle.		
(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.	Searches of the EPBC Act PMST and *NatureMap* database identified the presence/potential presence of 60 conservation significant fauna within a 20 km buffer of the project footprint. This total does not include those species that are exclusively marine as no marine habitat is present within the project footprint. The results identified 23 species listed as Threatened under the EPBC Act and/or Schedule 1-4 (Threatened) under the WC Act, 29 Migratory birds listed under the EPBC Act and/or Schedule 5 of the WC Act, and eight species listed as Priority by the DBCA. No baseline fauna surveys have been undertaken in the project footprint. There is potential for fauna habitat and conservation significant fauna to occur within the project footprint. A likelihood of occurrence assessment concluded that 22 conservation significant fauna species are likely to occur within the project footprint. The	The proposed clearing is unlikely to be at variance to this principle.	DBCA (2007–) DEE (2017a) GoWA (2017)

Principle	Assessment	Outcome	References
	majority of species considered likely to occur are fish and invertebrate species associated with Camerons Cave. Horizon Power will implement DBCA recommendations regarding the Camerons Cave TEC. The project footprint is unlikely to support fauna habitat that is in better condition than the surrounding available habitat. Furthermore, the project footprint is not likely to comprise of significant habitat for indigenous fauna. Clearing for the project is not likely to be at variance to this Principle.		
(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	No EPBC Act and/or WC Act listed flora have been identified within 20 km of the project footprint. The project footprint is not likely to include or be necessary for the continued existence of rare/threatened flora.	The proposed clearing is unlikely to be at variance to this principle.	DBCA TPFL and WAHERB databases DBCA (2007–) DEE (2017a)
(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.	Searches of the EPBC Act PMST and the DBCA TEC/PEC databases identified one TEC within the project footprint, the Camerons Cave Troglobitic Community, which is listed as a Critically Endangered TEC by DBCA. The project footprint occurs within the buffer of this TEC, however, is unlikely to directly impact on this community. Furthermore, DBCA has provided recommendations to Horizon Power to implement during construction of the project.	The proposed clearing is unlikely to be at variance to this principle.	DBCA TEC database DEC (2012) DEE (2017a)
(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.	The project footprint is located within the Carnarvon bioregion and Cape Range subregion as described by the IBRA. Broad scale (1:250,000) pre-European vegetation mapping of the area was completed by Beard (1976) at an association level. The mapping indicates that two vegetation associations are present within the project footprint, these are: • Shrublands; snakewood scrub (association 162) (small area in the south) • Hummock grasslands, shrub steppe; waterwood over soft spinifex (association 663) (majority of the footprint) The pre-European mapping has been adapted and digitised by Shepherd *et al.* (2002). The extent of vegetation associations have been determined by the state-wide vegetation remaining extent	The proposed clearing is unlikely to be at variance to this principles.	Beard (1976) GoWA (2018) Shepherd et al. (2002) Commonwealth of Australia (2001)

Principle	Assessment	Outcome	References
	calculations maintained by DBCA (latest update December 2017 – GoWA 2018). The current extents remaining of vegetation associations 162 and 663 at the State, IBRA bioregion, IBRA subregion and Local Government Area (LGA) levels are greater than 85 % of their calculated pre European extents, with the exception of association 162 which has 38.22 % of its current extent remaining within the Shire of Exmouth (Table 4). Only a very small area of vegetation association 162 occurs within the project footprint. The national objectives and targets for biodiversity conservation in Australia have a target to prevent clearance of ecological communities with an extent below 30 percent of that present pre-1750, below which species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia 2001). Given the vegetation extents remaining, the project footprint is not located within an area that has been extensively cleared.		
(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 numerous minor drainage lines that intersect or occur adjacent to the project footprint. There are several larger drainage lines that intersect the project footprint including Mowbowra Creek and an unnamed Creek near Shothole Canyon Road. Both of these drainage lines are ephemeral. A portion of the project footprint falls within the Cape Range Subterranean Waterways wetland that is listed under the Australian Government Directory of Important Wetlands of Australia. This wetland is described as a good example of a subterranean karst wetland system and the only one (apart from Barrow Island) in arid north-western Australia. The site meets two Ramsar Criteria for listing as a Wetland of International Importance (Jaensch and Watkins 1999) and recommended as a World Heritage site (DEE 2017b). The system contains a diverse, entirely endemic stygofauna and is mostly a relictual Tethys Sea fauna. The fauna includes the Blind Gudgeon *Milyeringa veritas*, the Blind Cave Eel *Ophisternon candidum*, and the only southern hemisphere representatives of entire classes, orders, families and genera of crustaceans (DEE 2017b). No baseline flora and vegetation surveys have been undertaken for the project footprint. The project footprint may include vegetation	The proposed clearing may be at variance to this principle.	DEE (2017b) GoWA (2017)

Principle	Assessment	Outcome	References
	associated with watercourses and a wetland and therefore may be at variance to this principle. Given the linear nature of the project footprint, the proposed clearing is not likely to have a significant impact on the identified watercourses or on the wetland.		
(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	The soils of the project footprint consisting predominantly of: • Learmonth System: Sandy outwash plains marginal to the Cape Range, supporting mainly soft spinifex hummock grasslands with scattered acacia shrubs. Given the permeable nature of the sandy soils within the project footprint the proposed clearing is unlikely to cause appreciable land degradation in the form of water erosion, water logging or flooding. Areas dominated by dispersive soils (e.g. clay soils) may be more prone to water erosion, particularly during high intensity rainfall events. However the areas dominated by sandy soils are more vulnerable to wind erosion. However given the long, linear nature of the clearing and with appropriate management practices the proposed clearing is unlikely to cause appreciable land degradation in the form of wind erosion. A review of the ASRIS risk mapping (ASRIS 2017) indicates that the project footprint is located within an area that has an extremely low probability of occurrence of acid sulfate soils (ASS) (1-5 per cent chance of occurrence within small localised areas) with a very low degree of confidence. There is one small area near Shothole Canyon Road that is mapped as having a high probability of occurrence of ASS (>70 % chance of occurrence) with a very low degree of confidence. Undisturbed ASS do not pose a risk, and only become an issue where excavation occurs.	The proposed clearing is unlikely to be at variance to this principle.	ASRIS (2017) GoWA (2017)
(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.	The project footprint does not intersect any conservation areas. The closest reserve is Cape Range National Park which is located approximately 5-6 km west of the project footprint. An area excised from Exmouth Gulf Station, which is proposed for conservation, is located approximately 1.3 km west of the project footprint. A portion of the project footprint falls within the Cape Range Subterranean Waterways wetland. This wetland is a subterranean	The proposed clearing is unlikely to be at variance to this principle.	DEE (2017a) GoWA (2017)

Principle	Assessment	Outcome	References
	karst wetland system. The clearing of native vegetation for the project is not likely to impact on the karst system. The entire project footprint is located within an ESA. The project will directly impact on an ESA associated with the entire Cape Rage Peninsula. The project will not directly impact on any conservation areas. It is anticipated that standard management practices that will be implemented during construction to mitigate aspects that have the potential to cause indirect impacts on nearby conservation areas, such as contamination through hydrocarbon spills and weed spread.		
(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.	There are numerous minor drainage lines that intersect or occur adjacent to the project footprint. There are also several larger drainage lines that intersect the project footprint including Mowbowra Creek and an unnamed Creek near Shothole Canyon Road. Both of these drainage lines are ephemeral. One Nationally Important Wetland, the Cape Range Subterranean Waterways, intersects the project footprint in the vicinity of Mowbowra Creek. This wetland is characterised by subterranean waterways and crevicular system in karstic limestone and coastal limestones, and is accessible through anchialine pools, wells, bores and caves. Consideration should be given to the need for targeted geotechnical investigations to inform drainage design and management to ensure the existing hydrological regime can be maintained. The project footprint is located within the proclaimed Gascoyne Groundwater Area and the Exmouth Water Reserve (Priority 1) PDWSA. Should groundwater be needed (taken) or a well/bore constructed/ altered, a licence from DWER may be required. Project excavations may impact karst environments and/or groundwater quality. Consideration as to the requirement for dedicated geotechnical investigations should be based on the ongoing planning/construction requirements for the project. The project footprint is located within the proclaimed Pilbara Surface Water Area. Should water be needed (taken) or diverted from a drainage line or wetland, a permit from DWER will be required. It is anticipated that the surface water hydrology can be maintained in its current regime with appropriate drainage design.	The proposed clearing is unlikely to be at variance to this principle.	DEE (2017b) GoWA (2017)

Principle	Assessment	Outcome	References
	It is considered unlikely that any clearing will significantly disturb or interrupt any natural drainage and surface run-off patterns. However, during heavy localised rainfall events erosion may occur in cleared areas leading to temporary soil erosion and/or sedimentation. These impacts are expected to be minimal and short-term. Furthermore, given the depth to groundwater it is considered unlikely that clearing will impact groundwater. Given appropriate management measures are undertaken during the project, the proposed clearing is unlikely to cause deterioration in the quality of surface or underground water.		
(j) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.	Given the sandy nature of the soils within the Project area and linear nature of the clearing footprint, it is unlikely that the removal of vegetation would cause or exacerbate the incidence or intensity of flooding or localised waterlogging in the local area.	The proposed clearing is unlikely to be at variance to this principle.	BoM (2018) Tille (2006)

6. References

Australian Soil Resource Information System (ASRIS) 2017, *Australian Soil Resource Information Viewer*, retrieved November 2017, from http://www.asris.csiro.au/index

Beard, JS 1976, Vegetation Survey of Western Australia: the Vegetation of the Shark Bay and Edel Areas Western Australia, map and explanatory memoir 1:250,000 series, Applecross, Vegmap Publications.

Bureau of Meteorology (BoM) 2017, *Climate Data Online*, retrieved November 2017, from http://www.bom.gov.au/climate/data/.

Department of Environment and Conservation (DEC) 2012, *Camerons Cave Troglobitic Community, Camerons Cave Millipede and Camerons Cave Pseudoscorpion*, Interim Recovery Plan 2012-2017, Plan No. 324, Perth, DEC.

Department of Biodiversity, Conservation and Attractions (DBCA) 2007–, *NatureMap: Mapping Western Australia's Biodiversity*, retrieved November 2017, from http://naturemap.dpaw.wa.gov.au/default.aspx/.

Department of the Environment and Energy (DEE) 2017a, *Environmental Protection and Biodiversity Conservation Act 1999 Protected Matters Search Tool Results*, retrieved November 2017, from http://www.environment.gov.au/epbc/pmst/index.html.

Department of the Environment and Energy (DEE) 2017b, *Directory of Important Wetlands in Australia, Cape Range Subterranean Waterways – WA006 Information Sheet*, retrieved November 2017, from http://www.environment.gov.au/cgi-bin/wetlands/report.pl?smode=DOIW;doiw_refcodelist=WA006.

Department of Water (DoW) 2007, Infrastructure corridors near sensitive water resources, Water quality protection note no. 83, retrieved January 2018, from https://www.water.wa.gov.au/__data/assets/pdf_file/0010/4042/82127.pdf.

Department of Water (DoW) 2016, Land use compatibility tables for public drinking water source areas, Water quality protection note no. 25, retrieved January 2018, from https://www.water.wa.gov.au/__data/assets/pdf_file/0014/1733/12441.pdf.

Department of Water and Environment Regulation (DWER) 2017a, *Clearing Permit System*, retrieved November 2017, from https://cps.der.wa.gov.au/main.html.

Department of Water and Environment Regulation (DWER) 2017b, *Contaminated Sites Database*, retrieved November 2017, from https://dow.maps.arcgis.com

Government of Western Australia (GoWA) 2017, data.wa.gov.au, retrieved November 2017, from https://data.wa.gov.au/.

Government of Western Australia (GoWA) 2018, 2017 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full report), Current as of December 2017, Perth, Australia, Department of Biodiversity, Conservation and Attractions, retrieved December 2017, from https://data.wa.gov.au/.

Kendrick, P and Mau, R 2002, Carnarvon 1 (CAR1 - Cape Range subregion), in Department of Conservation and Land Management (ed), A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002, pp 724.

Shepherd, DP, Beeston, GR, and Hopkins, AJM 2002, *Native Vegetation in Western Australia – Extent, Type and Status*, Resource Management Technical Report 249, Department of Agriculture, Western Australia.

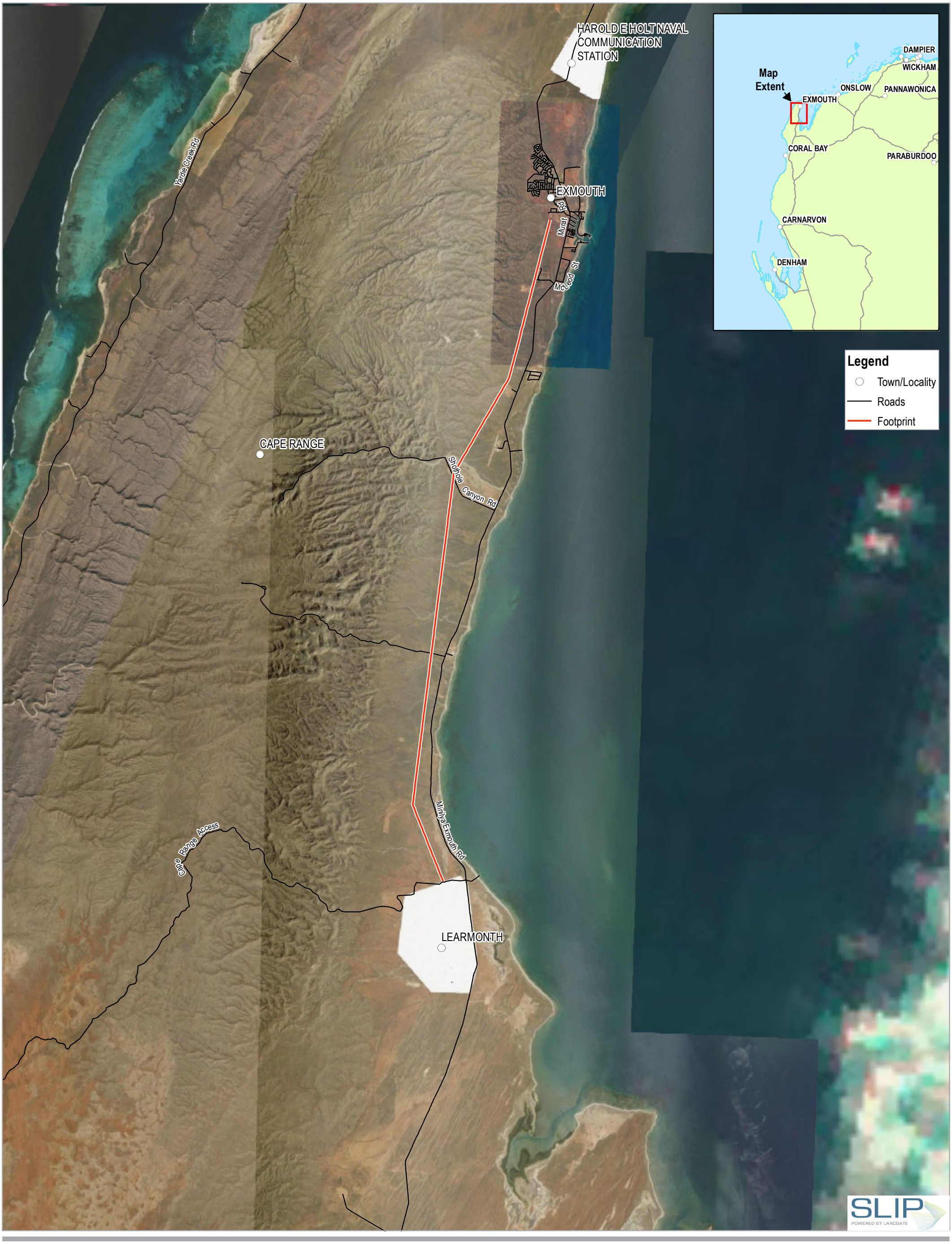
Tille, P 2006, *Soil-landscapes of Western Australia's Rangelands and Arid Interior*, Resource Management Technical Report 313, Perth, Department of Agriculture and Food.

Water and Rivers Commission 1999, *Groundwater Allocation Plan: Exmouth Groundwater Subarea*, Water Resource Allocation and Planning Series Report No. WRAP 9, Perth, Water and Rivers Commission.

Woodmand Environmental consulting 2013, Identification of Environmentally Sensitive Areas (ESAs) in the Gascoyne/Midwest Region, unpublished report prepared for horizon Power, February 2013.

Appendices

Appendix A – Figures



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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 49

N

GHD

Horizon Power
C0122-16-043 Prelim Impact Assessment Learmonth

Project Location

Project No. **61-3574913**
Revision No. **1**
Date **30/04/2018**

FIGURE 1

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Print date: 29 Jan 2018 - 11:25

Data source: Geoscience Australia: GeoData Topo 250k Series III; GHD: Alignment - 20171107; Landgate: Imagery, Roads. Created by: afeeney

HAROLD E HOLT NAVAL COMMUNICATION STATION

EXMOUTH

CAPE RANGE

LEARMONTH

Legend

- Town/Locality
- Project Footprint

Local Planning Scheme

- Industrial
- Light industrial
- Marina
- Mixed use
- Ocean
- Pastoral
- Public purposes
- Recreation and open space
- Residential
- Residential development
- Roads
- Special rural
- Special use
- Tourist
- Town centre

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 1 2 3 4 5

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 49

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GHD

Horizon Power
C0122-16-043 Prelim Impact Assessment Learmonth

Land Use

Project No. **61-3574913**
Revision No. **1**
Date **30/04/2018**

FIGURE 2

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Data source: Geoscience Australia: GeoData Topo 250k Series III; GHD: Alignment - 20171107; DoP: Local Planning Scheme - 20171207; Landgate: Imagery. Created by: afeeney

Jurabi Coastal Park
Bundegi Coastal Park
HAROLD E HOLT NAVAL COMMUNICATION STATION
Ningaloo Marine Park
EXMOUTH
CAPE RANGE
Cape Range National Park
LEARMONTH

Legend

- Project Footprint
- Environmentally Sensitive Area

DBCA Managed Land

- Marine Park
- National Park
- Unallocated Crown Land - Dept Interest
- Miscellaneous Reserve

Paper Size ISO A3

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Kilometres

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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 49

Horizon Power
C0122-16-043 Prelim Impact Assessment Learmonth

Conservation Areas and Environmentally Sensitive Area Constraints

Project No. **61-3574913**
Revision No. **1**
Date **30/04/2018**

FIGURE 3

G:\61\3574913\GIS\Maps\Working\613574913_003_Fig3ConAreasAndESA_Rev0.mxd
Print date: 29 Jan 2018 - 11:28

Data source: Geoscience Australia: GeoData Topo 250k Series III; GHD: Alignment - 20171107; DBCA: Managed Lands; DER: Environmentally Sensitive Areas; Landgate: Imagery. Created by: afeeney

Paper Size ISO A3

0 1 2 3 4 5

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 49

N

Horizon Power
C0122-16-043 Prelim Impact Assessment Learmonth

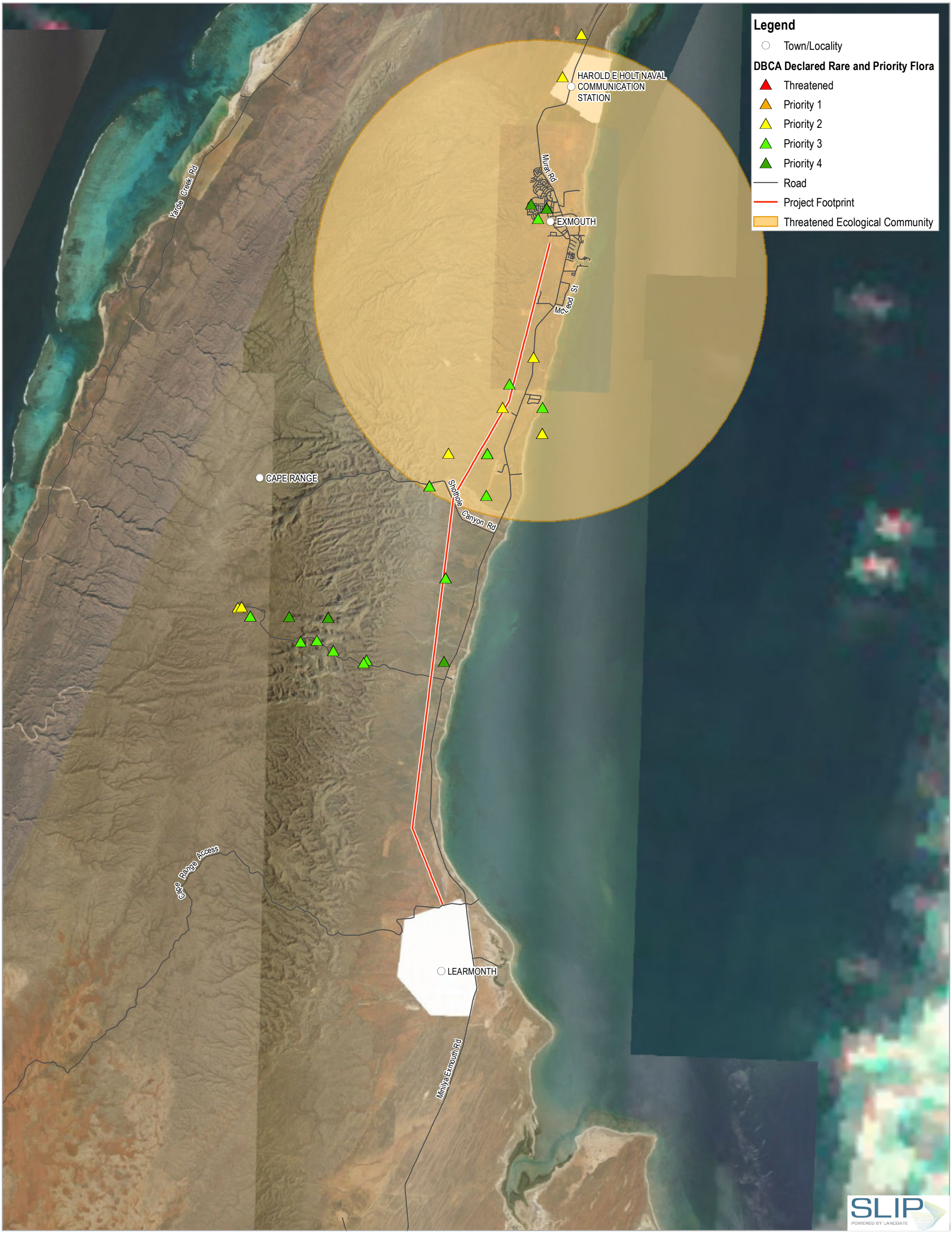
Hydrology Constraints

Project No. **61-3574913**
Revision No. **1**
Date **30/04/2018**

FIGURE 4

G:\61\3574913\GIS\Maps\Working\613574913_004_Fig4HydrologyConstraints_Rev0.mxd
Print date: 29 Jan 2018 - 11:29

Data source: Geoscience Australia: GeoData Topo 250k Series III; Landgate: Imagery, Roads, Watercourses; Bioregional Assessments: Directory of Important Wetlands in Australia - 20171201. Created by: afeeney



Paper Size ISO A3

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 49

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GHD

Horizon Power
C0122-16-043 Prelim Impact Assessment Learmonth

Biological Constraints

Project No. **61-3574913**
Revision No. **1**
Date **30/04/2018**

FIGURE 5

G:\61\3574913\GIS\Maps\Working\613574913_005_Fig5BiologicalConstraints_Rev0.mxd
Print date: 29 Jan 2018 - 11:30

Data source: Geoscience Australia: GeoData Topo 250k Series III; Landgate: Imagery, Roads; Horizon Power: DBCA Declared Rare and Priority Flora - 20171205, Threatened Ecological Community - 20171120.
Created by: afeeney

Appendix B – Relevant legislation, conservation codes and background information

Relevant legislation

Federal *Environment Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Federal Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as Matters of National Environmental Significance (MNES).

The biological aspects listed as MNES include:

- Nationally threatened flora and fauna species and ecological communities
- Migratory species

A person must not undertake an action that has, will have, or is likely to have a significant impact (direct or indirect) on MNES, without approval from the Federal Minister for the Environment.

The EPBC Act is administered by the Department of the Environment and Energy (DEE).

State *Environmental Protection Act 1986*

The *Environmental Protection Act 1986* (EP Act) is the primary legislative Act dealing with the protection of the environment in Western Australia. The Act allows the Environmental Protection Authority (EPA), to prevent, control and abate pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing. Part IV of the EP Act is administered by the EPA and makes provisions for the EPA to undertake environmental impact assessment of significant proposals, strategic proposals and land use planning schemes.

The Department of Water and Environment Regulation (DWER) is responsible for administering the clearing provisions of the EP Act (Part V). Clearing of native vegetation in Western Australia requires a permit from the DWER, unless exemptions apply. Applications for clearing permits are assessed by the Department and decisions are made to grant or refuse the application in accordance with the Act. When making a decision the assessment considers clearing against the ten clearing principles as specified in Schedule 5 of the EP Act:

a) Native vegetation should not be cleared if it comprises a high level of biodiversity.

b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a significance habitat for fauna indigenous to Western Australia.

c) Native vegetation should not be cleared if it includes, or is necessary, for the continued existence of rare flora.

d) Native vegetation should not be cleared if it comprises the whole or part of native vegetation in an area that has been extensively cleared.

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.

f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

g) 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.

h) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

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.

j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

Exemptions for clearing include clearing that is a requirement of a written law or authorised under certain statutory processes (listed in Schedule 6 of the EP Act) and exemptions for prescribed low impact day-to-day activities (prescribed in the Environmental Protection (Clearing of Native Vegetation) Regulations 2004); these exemptions do not apply in environmentally sensitive areas (ESAs).

State *Biodiversity and Conservation Act 2016*

The Biodiversity Conservation Bill 2015 was introduced to State Parliament in November 2015, and passed in September 2016. The Bill became the *Biodiversity Conservation Act 2016* (BC Act) upon receiving Assent on 21 September 2016. The BC Act will eventually fully replace both the *Wildlife Conservation Act 1950* (WC Act) and the *Sandalwood Act 1929* (Sandalwood Act).

Several parts of the BC Act were proclaimed by the State Governor in the Government Gazette and came into effect on 3 December 2016. However, provisions that replace those existing under the WC Act and Sandalwood Act (including threatened species listings and controls over the taking and keeping of native species) and their associated Regulations cannot be brought into effect until the necessary Biodiversity Conservation Regulations have been made. It is hoped the new Regulations will be completed and ready to commence by late 2017.

State *Wildlife Conservation Act 1950*

The WC Act provides for the conservation and protection of wildlife. It is administered by the Department of Biodiversity, Conservation and Attractions (DBCA) and applies to both flora and fauna. Any person wanting to capture, collect, disturb or study fauna requires a permit to do so. A permit is required under the WC Act if removal of threatened species is required.

State *Biosecurity and Agriculture Management Act 2007*

The *Biosecurity and Agriculture Management Act 2007* (BAM Act) and associated regulations are administered by the Department of Primary Industries and Regional Development (DPIRD) and replace the repealed *Agriculture and Related Resources Protection Act 1976.* The main purposes of the BAM Act and its regulations are to:

- Prevent new animal and plant pests (vermin and weeds) and diseases from entering WA
- Manage the impact and spread of those pests already present in the state
- Safely manage the use of agricultural and veterinary chemicals
- Increased control over the sale of agricultural products that contain violative chemical residues

The Western Australian Organism List (WAOL) provides the status of organisms which have been categorised under the BAM Act. A Declared Pest is a prohibited organism or an organism for which a declaration under Section 22(2) of the Act is in force. Declared Pests may be assigned a control category including: C1 (exclusion), C2 (eradication) and C3 (management). The category may apply to the whole

of the State, LGAs, districts, individual properties or even paddocks, and all landholders are obliged to comply with the specific category of control. Categories of control are defined below.

DPIRD Categories for Declared Pests under the BAM Act

Control class code	Description
C1 (Exclusion)	Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2 (Eradication)	Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
C3 (Management)	Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

Background information

Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are declared by the Minister for Environment under Section 51B of the EP Act. The Table below outlines the aspects of areas declared as ESA in the Environmental Protection (Environmentally Sensitive Areas) Notice 2005.

Aspects of ESAs

Aspects of Environmentally Sensitive Areas
A declared World Heritage property as defined in Section 13 of the EPBC Act.
An area that is included on the Register of the National Estate (RNE), because of its natural values, under the *Australian Heritage Commission Act 1975* of the Commonwealth (the RNE was closed in 2007 and is no longer a statutory list – all references to the RNE were removed from the EPBC Act on 19 February 2012).
A defined wetland and the area within 50 m of the wetland. Defined wetlands include Ramsar wetlands, conservation category wetlands and nationally important wetlands.
The area covered by vegetation within 50 m of rare flora, to the extent to which the vegetation is continuous with the vegetation in which the rare flora is located.
The area covered by a Threatened Ecological Community.
A Bush Forever Site listed in “Bush Forever” Volumes 1 and 2 (2000), published by the Western Australia Planning Commission, except to the extent to which the site is approved to be developed by the Western Australia Planning Commission.
The areas covered by the *Environmental Protection (Gnangara Mound Crown Land) Policy 1992*.
The areas covered by the *Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002*.
The areas covered by the lakes to which the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (EPP Lakes) applies.
Protected wetlands as defined in the *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998*.

Reserves and conservation areas

Department of Biodiversity, Conservation and Attractions managed lands and waters

DBCA manages lands and waters throughout Western Australia to conserve ecosystems and species, and to provide for recreation and appreciation of the natural environment. DBCA managed lands and waters include national parks, conservation parks and reserves, marine parks and reserves, regional parks, nature reserves, State forest and timber reserves. DBCA managed conservation estate, is vested with the Conservation Commission of Western Australia. Access to, or through, some areas of DBCA managed lands may require a permit or could be restricted due to management activities. Proposed land use changes and development proposals that abut DBCA managed lands will generally be referred to DBCA throughout the assessment process.

Wetlands

Wetlands include not only lakes with open water, but areas of seasonally, intermittently or permanently waterlogged soil.

Ramsar Listed Wetlands

The Convention of Wetlands of International Importance was signed in 1971 at the Iranian town of Ramsar. The Convention has since been referred to as the Ramsar Convention. Ramsar Listed wetlands are “sites containing representative, rare or unique wetlands, or wetlands that are important for conserving biological diversity … because of their ecological, botanical, zoological, limnological or hydrological importance” (DoEE 2017b). Once a Ramsar Listed Wetland is designated, the country agrees to manage its conservation and ensure its wise use. Under the Convention, wise use is broadly defined as “maintaining the ecological character of a wetland” (DoEE 2017b).

Nationally important wetlands

Wetlands of national significance are listed under the Directory of Important Wetlands in Australia. Nationally important wetlands are wetlands which meet at least one of the following criteria (DoEE 2017a):

- It is a good example of a wetland type occurring within a biogeographic region in Australia
- It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex
- It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail
- The wetland supports one percent or more of the national populations of any native plant or animal taxa
- The wetland supports native plant or animal taxa or communities which are considered endangered or vulnerable at the national level
- The wetland is of outstanding historical or cultural significance

Vegetation extent and status

The National Objectives and Targets for Biodiversity Conservation 2001–2005 (Commonwealth of Australia 2001) recognise that the retention of 30 percent or more of the pre-clearing extent of each ecological community is necessary if Australia’s biological diversity is to be protected. This is the threshold level below which species loss appears to accelerate exponentially and loss below this level should not be permitted. This level of recognition is in keeping with the targets recommended in the review of the National Strategy for the Conservation of Australia’s Biological Diversity (ANZECC 2000).

The extent of remnant native vegetation in WA has been assessed by Shepherd et al. (2002) and the GoWA (2016), based on broadscale vegetation association mapping by Beard (various publications). The GoWA produces Statewide Vegetation Statistics Reports that are used for a number of purposes including conservation planning, land use planning and when assessing development applications. The reports are updated at least every two years.

Conservation codes

Species of significant flora, fauna and communities are protected under both Federal and State Acts. The Federal EPBC Act provides a legal framework to protect and manage nationally important flora and communities. The State WC Act is the primary wildlife conservation legislation in Western Australia. Information on the conservation codes is summarised in the following sections.

Ecological communities

Conservation significant communities

Ecological communities are defined as naturally occurring biological assemblages that occur in a particular type of habitat (English and Blyth 1997). Federally listed Threatened Ecological Communities (TECs) are protected under the EPBC Act. The DBCA also maintains a list of TECs for Western Australia; some of which are also protected under the EPBC Act. TECs are ecological communities that have been assessed and assigned to one of four categories related to the status of the threat to the community, i.e. Presumed Totally Destroyed, Critically Endangered, Endangered and Vulnerable.

Possible TECs that do not meet survey criteria are added to the DBCA Priority Ecological Community (PEC) List under Priorities 1, 2 and 3. These are ecological communities that are adequately known; are rare but not threatened, or meet criteria for Near Threatened. PECs 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. PECs are not listed under any formal Federal or State legislation, however, may be listed as TECs under the EPBC Act.

Conservation codes and definitions for TECs listed under the EPBC Act or endorsed by the WA Minister for the Environment

Categories	Definition
Federal Government Conservation Categories (EPBC Act)	
Critically Endangered (CR)	An ecological community if, at that time, is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000)
Endangered (EN)	An ecological community if, at that time: A) is not critically endangered; and B) is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000)
Vulnerable (VU)	An ecological community if, at that time: A) is not critically endangered or endangered; and B) is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000)
Western Australia Conservation Categories	

Categories	Definition
Presumed Totally Destroyed (PD)	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

Conservation categories and definitions for PECS as listed by the DBCA

Category	Description
Priority 1	Poorly known ecological communities. Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤100 ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
Priority 2	Poorly known ecological communities. Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200 ha). At least some occurrences are not believed to be under immediate 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.

Category	Description
Priority 3	Poorly known ecological communities. (i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; (iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, 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 4	Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. (i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands. (ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (iii) Ecological communities that have been removed from the list of threatened communities during the past five years.
Priority 5	Conservation Dependent ecological communities. Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Other significant vegetation

Vegetation may be significant for a range of reasons other than a statutory listing. The EPA (2016b) states that significant vegetation may include vegetation that includes the following:

- Restricted distribution
- Degree of historical impact from threatening processes
- Local endemism in restricted habitats
- Novel combinations of taxa
- A role as a refuge
- A role as a key habitat for Threatened species or large population representing a significant proportion of the local to regional total population of a species
- Being representative of a vegetation unit in ‘pristine’ condition in a highly cleared landscape, recently discovered range extensions, or isolated outliers of the main range)

- Being poorly reserved

This may apply at a number of levels, so the unit may be significant when considered at the fine-scale (intra-locality), intermediate-scale (locality or inter-locality) or broad-scale (local to region).

Flora and fauna

Conservation significant flora and fauna

Species of significant flora are protected under both Federal and State legislation. Any activities that are deemed to have a significant impact on species that are recognised by the EPBC Act, and/or the WC Act can warrant referral to the DoEE and/or the EPA.

The Federal conservation level of flora and fauna species and their significance status is assessed under the EPBC Act. The significance levels for fauna used in the EPBC Act are those recommended by the International Union for Conservation of Nature (IUCN).

The EPBC Act also protects land and migratory species that are listed under International Agreements. The list of migratory species established under section 209 of the EPBC Act comprises:

- Migratory species which are native to Australia and are included in the appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II)
- Migratory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China–Australia Migratory Bird Agreement (CAMBA)
- Native, migratory species identified in a list established under, or an instrument made under, an international agreement approved by the Minister, such as the republic of Korea–Australia Migratory Bird Agreement (ROKAMBA)

The State conservation level of Threatened flora and fauna has been published as Specially Protected under the WC Act, and listed under Schedules 1 to 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2015 for Threatened Fauna and under Schedules 1 to 4 of the Wildlife Conservation (Rare Flora) Notice 2015 for Threatened (Declared Rare) Flora. The schedules align with the categories of the EPBC Act Threatened Fauna and Threatened Flora Lists. Threatened species are those are species which have been adequately searched for and are deemed to be, in the wild, either rare, under identifiable threat of extinction, or otherwise in need of special protection, and have been gazetted as such.

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 flora or fauna.

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.

For the purposes of this assessment, all species listed under the EPBC Act, WC Act and DBCA Priority species are considered conservation significant.

Conservation categories and definitions for EPBC Act listed flora and fauna species

Conservation category	Definition
Extinct	There is no reasonable doubt that the last member of the species has died.
Extinct in the Wild	A) A species known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or B) A species that has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered	A species facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000).
Endangered	A) A species not critically endangered; and B) A species facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable	A) A species not critically endangered or endangered; and B) A species facing a high risk of extinction in the wild in the medium-term, as determined in accordance with the prescribed criteria.
Conservation Dependent	A) The species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or B) The following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that Section 180 provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Conservation codes and descriptions for WC Act listed flora and fauna species

Conservation category	Schedule and definition
Threatened species (T)	Published as Specially Protected under the WC Act, and listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora. **Threatened fauna** is that subset of 'Specially Protected Fauna' declared to be 'likely to become extinct' pursuant to section 14(4) of the WC Act. **Threatened flora** is flora that has been declared to be 'likely to become extinct or is rare, or otherwise in need of special protection', pursuant to section 23F(2) of the WC Act.

Conservation category	Schedule and definition
Critically Endangered (CR)	Schedule 1: Threatened species considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	Schedule 2: Threatened species considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	Schedule 3: Threatened species considered to be facing a high risk of extinction in the wild.
Presumed Extinct (EX)	Schedule 4: Species which have been adequately searched for and there is no reasonable doubt that the last individual has died.
International Agreement (IA)	Schedule 5: Migratory birds protected under an international agreement
Conservation Dependent (CD)	Schedule 6: Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Other Specially Protected (OS)	Schedule 7: Fauna otherwise in need of special protection to ensure their conservation.

Conservation codes for DBCA listed Priority flora and fauna

Priority category	Definition
Priority 1	Poorly-known taxa Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
Priority 2	Poorly-known taxa Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3	Poorly-known taxa Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

Priority category	Definition
Priority 4	Rare, Near Threatened and other taxa in need of monitoring A. Rare: Taxa 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 taxa are usually represented on conservation lands. B. Near Threatened. Taxa 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. Taxa that have been removed from the list of threatened taxa during the past five years for reasons other than taxonomy.

Other significant flora

Flora species, subspecies, varieties, hybrids and ecotypes may be significant for a range of reasons, other than a statutory listing. The EPA (2016b) states that significant flora may include taxa that have:

- A keystone role in a particular habitat for threatened or Priority flora or fauna species, or large populations representing a considerable proportion of the local or regional total population of a species
- Relictual status, being representation of taxonomic or physiognomic groups that no longer occur widely in the broader landscape
- Anomalous features that indicate a potential new discovery
- Being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
- The presence of restricted subspecies, varieties, or naturally occurring hybrids
- Local endemism (a restricted distribution) or association with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems)
- Being poorly reserved

Other significant fauna

Fauna species may be significant for a range of reasons other than those protected by international agreement or treaty, Specially Protected or Priority Fauna. Significant fauna may include short-range endemic species, species that have declining populations or declining distributions, species at the extremes of their range, or isolated outlying populations, or species which may be undescribed (EPA 2010).

References

ANZECC 2000, *Core Environmental Indicators for Reporting on the State of Environment*, ANZECC State of the Environment Reporting Task Force.

Commonwealth of Australia 2001, *National Targets and Objectives for Biodiversity Conservation 2001–2005*, Canberra, AGPS.

DEE 2017a, *Criteria for determining nationally important wetlands*, retrieved 2017, from http://www.environment.gov.au/topics/water/water-our-environment/wetlands/australian-wetlands-database/directory-important.

DEE 2017b, *The Ramsar Convention on Wetlands*, retrieved 2017, from http://www.environment.gov.au/topics/water/water-our-environment/wetlands/ramsar-convention-wetlands.

English, V and Blyth, J 1997, *Identifying and Conserving Threatened Ecological Communities in the South West Botanical Province*, Perth, Department of Conservation and Land Management.

EPA 2010, *Technical Guide – Terrestrial Fauna Surveys*, EPA, Perth, WA.

EPA 2016a, *Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment*, EPA, Perth, WA.

EPA 2016b, *Environmental Factor Guideline - Flora and Vegetation*, EPA, Perth, WA.

GoWA 2016, *Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full report)*, Current as of October 2016, Perth Western Australia, Department of Environment and Conservation, retrieved November 2017, from https://www2.landgate.wa.gov.au/web/guest/downloader.

Shepherd, DP, Beeston, GR & Hopkins, AJM 2002, *Native Vegetation in Western Australia – Extent, Type and Status, Resource Management Technical Report 249*, Perth, Department of Agriculture.

Appendix C – Desktop searches

EPBC Act PMST (20 km buffer)

NatureMap flora report (20 km buffer)

NatureMap fauna report (20 km buffer)

Australian Government
Department of the Environment and Energy

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.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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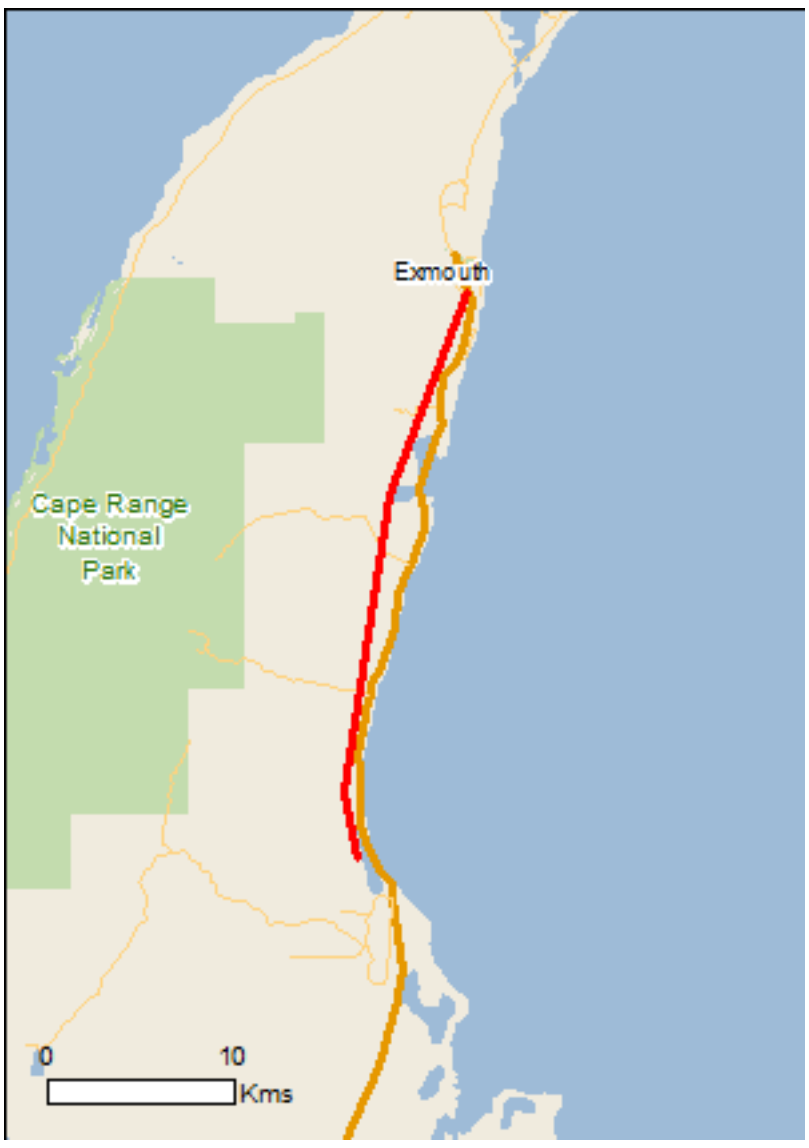

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Coordinates
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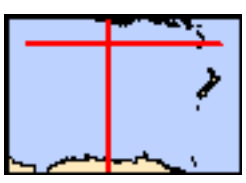

Summary

Matters of National Environmental Significance

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

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	31
Listed Migratory Species:	42

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at 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 Land:	8
Commonwealth Heritage Places:	None
Listed Marine Species:	77
Whales and Other Cetaceans:	15
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	3
Regional Forest Agreements:	None
Invasive Species:	10
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

World Heritage Properties		[Resource Information]
Name	State	Status
The Ningaloo Coast	WA	Declared property

National Heritage Properties		[Resource Information]
Name	State	Status
Natural		
The Ningaloo Coast	WA	Listed place

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Fish		
Milyeringa veritas Blind Gudgeon [66676]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Ophisternon candidum		
Blind Cave Eel [66678]	Vulnerable	Species or species habitat known to occur within area
Mammals		
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus hallucatus		
Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Petrogale lateralis lateralis		
Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Species or species habitat known to occur within area
Rhinonicteris aurantia (Pilbara form)		
Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Aipysurus apraefrontalis		
Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Sharks		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat may occur within area
Fregata ariel		
Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Macronectes giganteus		
Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata		
Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
Balaena glacialis australis		
Southern Right Whale [75529]	Endangered*	Species or species habitat likely to occur within area
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding known to occur within area

Name	Threatened	Type of Presence
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Dugong dugon Dugong [28]		Breeding known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species

Name	Threatened	Type of Presence
		habitat likely to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Charadrius veredus](#) Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
[Glareola maldivarum](#) Oriental Pratincole [840]		Species or species habitat may occur within area
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat known to occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
[Pandion haliaetus](#) Osprey [952]		Breeding known to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [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.

Name
Commonwealth Land -
Defence - EXMOUTH ADMIN & HF TRANSMITTING
Defence - EXMOUTH NAVAL HF RECEIVING STATION (H/F Receiving Station, Learmonth, WA)
Defence - EXMOUTH VLF TRANSMITTER STATION
Defence - LEARMONTH - RAAF BASE
Defence - LEARMONTH RADAR SITE - TWIN TANKS EXMOUTH
Defence - LEARMONTH RADAR SITE - VLAMING HEAD EXMOUTH
Defence - LEARMONTH TRANSMITTING STATION

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area
[Anous stolidus](#) Common Noddy [825]		Species or species habitat likely to occur within area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardea alba](#) Great Egret, White Egret [59541]		Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area

Name	Threatened	Type of Presence
[Pterodroma mollis](#) Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
[Puffinus carneipes](#) Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
[Thalassarche impavida](#) Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
[Acentronura larsonae](#) Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
[Bulbonaricus brauni](#) Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
[Campichthys tricarinatus](#) Three-keel Pipefish [66192]		Species or species habitat may occur within area
[Choeroichthys brachysoma](#) Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
[Choeroichthys latispinosus](#) Muiron Island Pipefish [66196]		Species or species habitat may occur within area
[Choeroichthys suillus](#) Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
[Doryrhamphus dactyliophorus](#) Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
[Doryrhamphus janssi](#) Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
[Doryrhamphus multiannulatus](#) Many-banded Pipefish [66717]		Species or species habitat may occur within area
[Doryrhamphus negrosensis](#) Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
[Festucalex scalaris](#) Ladder Pipefish [66216]		Species or species habitat may occur within area
[Filicampus tigris](#) Tiger Pipefish [66217]		Species or species habitat may occur within area
[Halicampus brocki](#) Brock's Pipefish [66219]		Species or species habitat may occur within area
[Halicampus grayi](#) Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paegnius Rough-snout Ghost Pipefish [68425]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		

Name	Threatened	Type of Presence
Dugong dugon Dugong [28]		Breeding known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
Ephalophis greyi North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Bundegi Coastal Park	WA
Cape Range	WA
Jurabi Coastal Park	WA

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Mammals		
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Cape Range Subterranean Waterways	WA

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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

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

Where very little information is available for 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 reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Coordinates

-21.943941 114.131439,-22.034352 114.09436,-22.167952 114.072387,-22.1972 114.079254

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.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

NatureMap
Mapping Western Australia's biodiversity

Naturemap Flora Report 20 km

Created By Guest user on 01/12/2017

Kingdom	Plantae
Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Line'
Vertices	21° 57' 36" S,114° 07' 27" E 22° 07' 44" S,114° 04' 43" E 22° 10' 12" S,114° 04' 26" E 22° 12' 24" S,114° 04' 59" E
Group By	Family

Family	Species	Records
Acanthaceae	5	29
Aizoaceae	2	3
Amaranthaceae	18	48
Anadyomenaceae	2	2
Apiaceae	1	3
Apocynaceae	8	14
Asparagaceae	5	25
Asphodelaceae	1	2
Asteraceae	43	127
Bignoniaceae	1	2
Bonnemaisoniaceae	1	1
Boodleaceae	1	1
Boraginaceae	6	21
Brassicaceae	5	10
Callithamniaceae	1	1
Campanulaceae	4	5
Capparaceae	5	14
Caulerpaceae	10	15
Celastraceae	3	16
Ceramiaceae	2	2
Champiaceae	2	3
Chenopodiaceae	30	51
Cladophoraceae	1	1
Cleomaceae	1	3
Colchicaceae	1	7
Commelinaceae	1	5
Convolvulaceae	10	36
Corallinaceae	1	1
Crassulaceae	2	3
Cymodoceaceae	5	23
Cyperaceae	4	6
Dichotomosiphonaceae	1	1
Dilleniaceae	2	12
Emblingiaceae	1	1
Euphorbiaceae	10	35
Fabaceae	69	275
Frankeniaceae	1	6
Galaxauraceae	2	3
Gentianaceae	2	3
Geraniaceae	2	6
Goodeniaceae	13	68
Gracilariaceae	2	4
Gyrostemonaceae	1	5
Halimedaceae	4	12
Haloragaceae	3	4
Hemerocallidaceae	4	11
Hydrocharitaceae	2	7
Isoetaceae	2	2
Juncaginaceae	1	2
Lamiaceae	9	22
Lauraceae	3	11
Liagoraceae	2	4
Loganiaceae	1	8
Loranthaceae	6	27
Malvaceae	38	113
Marsileaceae	2	2
Menispermaceae	1	9
Montiaceae	1	3
Moraceae	2	10
Myrtaceae	19	153
Nyctaginaceae	3	6
Olacaceae	1	1
Oleaceae	2	9
Ophioglossaceae	3	4
Orchidaceae	1	1
Orobanchaceae	1	2
Phrymaceae	1	5
Phyllanthaceae	5	14
Pittosporaceae	2	5
Plantaginaceae	4	9
Plumbaginaceae	3	15
Poaceae	39	95
Polygonaceae	1	1
Polyphysaceae	1	1
Portulacaceae	2	5

Pottiaceae	1	1
Primulaceae	2	3
Proteaceae	11	55
Pteridaceae	3	3
Rhizophoraceae	2	6
Rhizophyllidaceae	1	2
Rhodomelaceae	5	6
Rhodymeniaceae	1	2
Ricciaceae	3	3
Rubiaceae	3	9
Ruppiaceae	1	1
Rutaceae	1	2
Santalaceae	3	15
Sapindaceae	4	12
Scrophulariaceae	8	29
Solanaceae	10	26
Solieriaceae	1	2
Surianaceae	1	2
Thymelaeaceae	2	13
Udoteaceae	1	1
Urticaceae	1	2
Valoniaceae	2	2
Verbenaceae	1	1
Violaceae	2	5
Zygophyllaceae	9	26
TOTAL	**536**	**1701**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Acanthaceae					
1.	6828	*Avicennia marina (White Mangrove)*			
2.	7164	*Dicladanthera forrestii*			
3.	11320	*Dipteracanthus australasicus subsp. australasicus*			
4.	11746	*Dipteracanthus australasicus subsp. corynothecus*			
5.	17327	*Harnieria kempeana subsp. rhadinophylla*		P2	Y
Aizoaceae					
6.	2818	*Sesuvium portulacastrum*			
7.	44305	*Trianthema pilosum*			
Amaranthaceae					
8.	2645	*Achyranthes aspera (Chaff Flower)*			
9.	2646	*Aerva javanica (Kapok Bush)*	Y		
10.	2653	*Alternanthera pungens (Khaki Weed)*	Y		
11.	2657	*Amaranthus clementii*			
12.	20018	*Amaranthus undulatus*			
13.	2677	*Gomphrena celosioides (Gomphrena Weed)*	Y		
14.	2696	*Ptilotus astrolasius*			
15.	2699	*Ptilotus axillaris (Mat Mulla Mulla)*			
16.	2711	*Ptilotus clementii (Tassel Top)*			
17.	2717	*Ptilotus divaricatus (Climbing Mulla Mulla)*			
18.	41506	*Ptilotus gaudichaudii subsp. gaudichaudii*			
19.	2731	*Ptilotus helipteroides (Hairy Mulla Mulla)*			
20.	2746	*Ptilotus nobilis (Tall Mulla Mulla)*			
21.	41001	*Ptilotus nobilis subsp. nobilis (Yellow Tails)*			
22.	2747	*Ptilotus obovatus (Cotton Bush)*			
23.	2751	*Ptilotus polystachyus (Prince of Wales Feather)*			
24.	2766	*Ptilotus villosiflorus*			
25.	43203	*Surreya diandra*			
Anadyomenaceae					
26.	35872	*Anadyomene plicata*			
27.	35858	*Anadyomene wrightii*			
Apiaceae					
28.	6218	*Daucus glochidiatus (Australian Carrot)*			
Apocynaceae					
29.	6569	*Catharanthus roseus (Pink Periwinkle)*	Y		
30.	6584	*Cynanchum floribundum (Dumara Bush, Tjipa)*			
31.	48280	*Cynanchum viminale subsp. australe*			
32.	12832	*Gymnanthera cunninghamii*		P3	
33.	12949	*Marsdenia australis*			
34.	6599	*Rhyncharrhena linearis (Bush Bean, Wintjulanypa)*			
35.	13100	*Tylophora cinerascens*			
36.	6602	*Tylophora flexuosa*			
Asparagaceae					
37.	1208	*Acanthocarpus preissii*			
38.	1209	*Acanthocarpus robustus*			
39.	1210	*Acanthocarpus rupestris*		P2	
40.	1211	*Acanthocarpus verticillatus*			
41.	46756	*Thysanotus exfimbriatus*			
Asphodelaceae					
42.	1364	*Asphodelus fistulosus (Onion Weed)*	Y		
Asteraceae					
43.	7822	*Angianthus acrohyalinus (Hook-leaf Angianthus)*			
44.	7827	*Angianthus cunninghamii (Coast Angianthus)*			
45.	7838	*Arctotheca calendula (Cape Weed, African Marigold)*	Y		
46.	7854	*Bidens bipinnata (Bipinnate Beggartick)*	Y		
47.	46338	*Bidens subalternans var. simulans*	Y		
48.	7906	*Calotis plumulifera*			
49.	47174	*Chrysocephalum apiculatum subsp. pilbarense*			
50.	7958	*Decazesia hecatocephala*			
51.	35558	*Flaveria trinervia (Speedy Weed)*	Y		
52.	8086	*Hypochaeris glabra (Smooth Catsear)*	Y		
53.	8098	*Launaea sarmentosa*			
54.	8105	*Millotia myosotidifolia*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
55.	8107	*Minuria cunninghamii (Bush Minuria)*			
56.	8110	*Minuria leptophylla (Minnie Daisy)*			
57.	42024	*Olearia sp. Kennedy Range (G. Byrne 66)*			
58.	20611	*Pembertonia latisquamea*			
59.	34997	*Peripleura arida*			
60.	35003	*Peripleura hispidula var. setosa*			
61.	8167	*Pluchea dentex*			
62.	17816	*Pluchea ferdinandi-muelleri*			
63.	43944	*Pluchea longiseta*			
64.	8168	*Pluchea rubelliflora*			
65.	45237	*Podolepis aristata subsp. aristata*			
66.	45242	*Podolepis remota*			
67.	8189	*Pseudognaphalium luteoalbum (Jersey Cudweed)*			
68.	8192	*Pterocaulon sphacelatum (Apple Bush, Fruit Salad Plant)*			
69.	8193	*Pterocaulon sphaeranthoides*			
70.	13291	*Rhodanthe condensata*			
71.	13301	*Rhodanthe floribunda*			
72.	13246	*Rhodanthe humboldtiana*			
73.	13297	*Rhodanthe psammophila*			
74.	13254	*Rhodanthe stricta*			
75.	45148	*Roebuckiella ciliocarpa*			
76.	45146	*Roebuckiella oncocarpa*			
77.	13285	*Schoenia ayersii*			
78.	25880	*Senecio hamersleyensis*			
79.	8213	*Senecio magnificus (Showy Groundsel)*			
80.	20161	*Senecio pinnatifolius*			
81.	25883	*Senecio pinnatifolius var. pinnatifolius*			
82.	8223	*Sigesbeckia orientalis (Indian Weed)*	Y		
83.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		
84.	8237	*Streptoglossa decurrens*			
85.	8238	*Streptoglossa liatroides*			
Bignoniaceae					
86.	36447	*Tecoma stans var. stans*	Y		
Bonnemaisoniaceae					
87.	26486	*Asparagopsis taxiformis*			
Boodleaceae					
88.	44726	*Cladophoropsis vaucheriiformis*			
Boraginaceae					
89.	6680	*Cynoglossum australe (Australian Hound's-tongue)*			
90.	29840	*Halgania cyanea var. Allambi Stn (B.W. Strong 676)*			
91.	6705	*Heliotropium crispatum*			
92.	17305	*Heliotropium glanduliferum*			
93.	6713	*Heliotropium ovalifolium*			
94.	6727	*Trichodesma zeylanicum (Camel Bush, Kumbalin)*			
Brassicaceae					
95.	3032	*Lepidium muelleri-ferdinandii*			
96.	3035	*Lepidium pedicellosum*			
97.	3039	*Lepidium platypetalum (Slender Peppercress)*			
98.	3061	*Raphanus raphanistrum (Wild Radish)*	Y		
99.	3072	*Sisymbrium orientale (Indian Hedge Mustard)*	Y		
Callithamniaceae					
100.	27204	*Ptilocladia vestita*			
Campanulaceae					
101.	7403	*Lobelia heterophylla (Wing-seeded Lobelia)*			
102.	7385	*Wahlenbergia communis (Native Bluebell)*			
103.		*Wahlenbergia sp.*			
104.	7393	*Wahlenbergia tumidifructa*			
Capparaceae					
105.	2976	*Capparis lasiantha (Split Jack, Balqarda)*			
106.	2978	*Capparis mitchellii (Wild Orange)*			
107.		*Capparis sp.*			
108.	2981	*Capparis spinosa*			
109.	48291	*Capparis spinosa subsp. nummularia*			
Caulerpaceae					
110.	26554	*Caulerpa brachypus*			
111.	42620	*Caulerpa chemnitzia*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
112.	35158	*Caulerpa corynephora*			
113.	26559	*Caulerpa cupressoides*			
114.	27378	*Caulerpa cupressoides var. lycopodium*			
115.	44547	*Caulerpa lamourouxii*			
116.	26568	*Caulerpa lentillifera*			
117.	44551	*Caulerpa macrodisca*			
118.	26576	*Caulerpa serrulata*			
119.	26577	*Caulerpa sertularioides*			
Celastraceae					
120.	4734	*Stackhousia muricata*			
121.	43601	*Stackhousia sp. Mid west coastal (D. & B. Bellairs 6561)*			
122.	4736	*Stackhousia umbellata*		P3	
Ceramiaceae					
123.	26469	*Anotrichium tenue*			
124.	27310	*Spyridia filamentosa*			
Champiaceae					
125.	26618	*Champia parvula*			
126.	26619	*Champia stipitata*			
Chenopodiaceae					
127.	2453	*Atriplex codonocarpa (Flat-topped Saltbush)*			
128.	2456	*Atriplex elachophylla*			
129.	2463	*Atriplex isatidea (Coast Saltbush)*			
130.	2476	*Atriplex semilunaris (Annual Saltbush)*			
131.	2489	*Chenopodium gaudichaudianum (Cottony Saltbush)*			
132.	2499	*Dissocarpus paradoxus (Curious Saltbush)*			
133.	33501	*Dysphania cristata (Crested Goosefoot)*			
134.	2504	*Dysphania plantaginella*			
135.	2511	*Enchylaena tomentosa (Barrier Saltbush)*			
136.	12064	*Enchylaena tomentosa var. tomentosa (Barrier Saltbush)*			
137.	2513	*Eremophea spinosa*			
138.	2546	*Maireana integra*			
139.	2556	*Maireana planifolia (Low Bluebush)*			
140.	2558	*Maireana polypterygia (Gascoyne Bluebush)*			
141.	11662	*Maireana tomentosa subsp. tomentosa*			
142.	2573	*Neobassia astrocarpa*			
143.	2582	*Rhagodia eremaea (Thorny Saltbush)*			
144.	2584	*Rhagodia preissii*			
145.	11240	*Rhagodia preissii subsp. obovata*			
146.	30434	*Salsola australis*			
147.	2609	*Sclerolaena diacantha (Grey Copperburr)*			
148.	8877	*Sclerolaena gardneri*			
149.	2628	*Sclerolaena recurvicuspis*			
150.	2638	*Suaeda arbusculoides*			
151.	33236	*Tecticornia halocnemoides (Shrubby Samphire)*			
152.	33238	*Tecticornia halocnemoides subsp. tenuis*			
153.	33318	*Tecticornia indica subsp. leiostachya (Samphire)*			
154.	31618	*Tecticornia pruinosa*			
155.	33220	*Tecticornia pterygosperma subsp. denticulata*			
156.	2644	*Threlkeldia diffusa (Coast Bonefruit)*			
Cladophoraceae					
157.	26658	*Cladophora vagabunda*			
Cleomaceae					
158.	2988	*Cleome viscosa (Tickweed, Tjinduwadhu)*			
Colchicaceae					
159.	1400	*Wurmbea odorata*			
Commelinaceae					
160.	1165	*Commelina ensifolia (Wandering Jew, Buargu)*			
Convolvulaceae					
161.	31274	*Duperreya commixta*			
162.	11416	*Evolvulus alsinoides var. decumbens*			
163.	11200	*Evolvulus alsinoides var. villosicalyx*			
164.	6624	*Ipomoea costata (Rock Morning Glory, Kanti)*			
165.	6633	*Ipomoea muelleri (Poison Morning Glory, Yumbu)*			
166.	6635	*Ipomoea pes-caprae*			
167.	11312	*Ipomoea pes-caprae subsp. brasiliensis*			
168.	6637	*Ipomoea polymorpha*			

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169.	6641	*Ipomoea yardiensis (Yardie Morning Glory)*			
170.	6653	*Polymeria ambigua (Morning Glory)*			
Corallinaceae					
171.	26983	*Jania adhaerens*			
Crassulaceae					
172.	3137	*Crassula colorata (Dense Stonecrop)*			
173.	11563	*Crassula colorata var. colorata*			
Cymodoceaceae					
174.	128	*Cymodocea angustata*			
175.	129	*Cymodocea serrulata*			
176.	131	*Halodule uninervis*			
177.	132	*Syringodium isoetifolium*			
178.	133	*Thalassodendron ciliatum*			
Cyperaceae					
179.	750	*Bulbostylis barbata*			
180.	777	*Cyperus bulbosus (Bush Onion, Tjanmata)*			
181.	814	*Cyperus squarrosus*			
182.	818	*Cyperus vaginatus (Stiffleaf Sedge)*			
Dichotomosiphonaceae					
183.	26498	*Avrainvillea obscura*			
Dilleniaceae					
184.	5171	*Hibbertia spicata*			
185.	11481	*Hibbertia spicata subsp. spicata*			
Emblingiaceae					
186.	2989	*Emblingia calceoliflora*			
Euphorbiaceae					
187.	17422	*Adriana tomentosa var. tomentosa*			
188.	35307	*Euphorbia australis var. australis*			
189.	4619	*Euphorbia biconvexa*			
190.	4626	*Euphorbia drummondii (Caustic Weed, Piwi)*			
191.	4635	*Euphorbia myrtoides*			
192.	4644	*Euphorbia sharkoensis*			
193.	4647	*Euphorbia tannensis*			
194.	12097	*Euphorbia tannensis subsp. eremophila (Desert Spurge)*			
195.	42879	*Euphorbia trigonosperma*			
196.	4658	*Mallotus nesophilus*			
Fabaceae					
197.	13074	*Acacia alexandri*		P3	
198.	3223	*Acacia arida*			
199.	3241	*Acacia bivenosa*			
200.	3270	*Acacia coriacea (Wirewood)*			
201.	13500	*Acacia coriacea subsp. coriacea*			
202.	3356	*Acacia gregorii (Gregory's Wattle)*			
203.	3452	*Acacia murrayana (Sandplain Wattle)*			
204.	3506	*Acacia pyrifolia (Ranji Bush, Kandji)*			
205.	29015	*Acacia pyrifolia var. pyrifolia*			
206.	13071	*Acacia ryaniana*		P2	
207.	13078	*Acacia sclerosperma subsp. sclerosperma*			
208.	29135	*Acacia sericophylla*			
209.	3549	*Acacia spathulifolia*			
210.	13076	*Acacia startii*		P3	
211.	19456	*Acacia stellaticeps*			
212.	13070	*Acacia synchronicia*			
213.	3577	*Acacia tetragonophylla (Kurara, Wakalpuka)*			
214.	3606	*Acacia xiphophylla*			
215.	3749	*Canavalia rosea (Wild Jack Bean)*			
216.	13114	*Chorizema racemosum*			
217.	3774	*Crotalaria cunninghamii (Green Birdflower, Bilbun)*			
218.	18147	*Crotalaria incana subsp. incana*	Y		
219.	3783	*Crotalaria medicaginea*			
220.	20179	*Crotalaria medicaginea var. neglecta*			
221.	17439	*Cullen lachnostachys*			
222.	17118	*Cullen leucanthum*			
223.	17120	*Cullen pogonocarpum*			
224.	14375	*Daviesia pleurophylla*		P2	
225.	3871	*Erythrina vespertilio (Yulbah)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
226.	3938	*Glycine canescens (Silky Glycine)*			
227.	17113	*Indigofera boviperda subsp. boviperda*			
228.	45436	*Indigofera chamaeclada subsp. pubens*			
229.	3973	*Indigofera colutea (Sticky Indigo)*			
230.	3980	*Indigofera linifolia*			
231.	3981	*Indigofera linnaei (Birdsville Indigo)*			
232.	3982	*Indigofera monophylla*			
233.		*Indigofera sp.*			
234.	3987	*Indigofera trita*			
235.	3989	*Isotropis atropurpurea (Poison Sage)*			
236.	3664	*Labichea cassioides*			
237.	16489	*Leptosema macrocarpum*			
238.	18351	*Leucaena leucocephala subsp. leucocephala*	Y		
239.	4060	*Lotus australis (Austral Trefoil)*			
240.	24021	*Lotus australis var. australis*			
241.	4061	*Lotus cruentus (Redflower Lotus)*			
242.	4097	*Mirbelia ramulosa*			
243.	4105	*Mirbelia viminalis*			
244.	3673	*Parkinsonia aculeata (Parkinsonia)*	Y		
245.	3674	*Petalostylis cassioides*			
246.	4191	*Rhynchosia minima (Rhynchosia)*			
247.	12280	*Senna artemisioides subsp. oligophylla*			
248.	18443	*Senna ferraria*			
249.	12307	*Senna glutinosa subsp. glutinosa*			
250.	12309	*Senna glutinosa subsp. pruinosa*			
251.	12312	*Senna notabilis*			
252.		*Sesbania sp.*			
253.	12353	*Stylosanthes hamata (Verano Stylo)*	Y		
254.	13592	*Swainsona calcicola*			
255.	13596	*Swainsona complanata*			
256.	12356	*Swainsona formosa*			
257.	4231	*Swainsona kingii*			
258.	4233	*Swainsona leeana*			
259.	4242	*Swainsona pterostylis*			
260.	19531	*Tephrosia rosea var. clementii*			
261.	41815	*Tephrosia sp. Carnarvon (J.H. Ross 2681)*			
262.	46053	*Tephrosia sp. North West Cape (G. Marsh 81)*		P2	
263.	30716	*Vachellia farnesiana (Mimosa Bush)*	Y		
264.	4323	*Vigna lanceolata (Maloga Vigna, Wega)*			
265.	31391	*Vigna sp. Hamersley Clay (A.A. Mitchell PRP 113)*			
Frankeniaceae					
266.	5209	*Frankenia pauciflora (Seaheath)*			
Galaxauraceae					
267.	29616	*Dichotomaria marginata*			
268.	26835	*Galaxaura rugosa*			
Gentianaceae					
269.	41660	*Schenkia australis*			
270.	41646	*Schenkia clementii*			
Geraniaceae					
271.	4332	*Erodium botrys (Long Storksbill)*	Y		
272.	4335	*Erodium cygnorum (Blue Heronsbill)*			
Goodeniaceae					
273.	7448	*Dampiera incana (Hoary Dampiera)*			
274.	11723	*Dampiera incana var. incana*			
275.	7509	*Goodenia forrestii*			
276.	7526	*Goodenia microptera*			
277.	12574	*Goodenia prostrata*			
278.	7556	*Goodenia tenuiloba*			
279.	7588	*Lechenaultia subcymosa (Wide-branching Leschenaultia)*			
280.	7606	*Scaevola crassifolia (Thick-leaved Fan-flower)*			
281.	7608	*Scaevola cunninghamii*			
282.	12584	*Scaevola pulchella*			
283.	7643	*Scaevola sericophylla*			
284.	7644	*Scaevola spinescens (Currant Bush, Maroon)*			
285.	7648	*Scaevola tomentosa (Raggedleaf Fanflower)*			
Gracilariaceae					
286.	35899	*Gracilaria canaliculata*			

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287.	35905	*Hydropuntia eucheumatoides*			
Gyrostemonaceae					
288.	2784	*Gyrostemon ramulosus (Corkybark)*			
Halimedaceae					
289.	26892	*Halimeda discoidea*			
290.	26894	*Halimeda macroloba*			
291.	26898	*Halimeda velasquezii*			
292.	47213	*Halimeda versatilis*			
Haloragaceae					
293.	6174	*Haloragis gossei*			
294.	23464	*Haloragis gossei var. inflata*			
295.	6180	*Haloragis trigonocarpa*			
Hemerocallidaceae					
296.	1284	*Corynotheca flexuosissima*			
297.	1285	*Corynotheca micrantha (Sand Lily)*			
298.	1286	*Corynotheca pungens*			
299.	1360	*Tricoryne corynothecoides*			
Hydrocharitaceae					
300.	164	*Halophila ovalis (Sea Wrack)*			
301.	169	*Thalassia hemprichii*			
Isoetaceae					
302.	11	*Isoetes drummondii (Quillwort)*			
303.	12	*Isoetes inflata*			
Juncaginaceae					
304.	145	*Triglochin hexagona (Six-point Arrowgrass)*			
Lamiaceae					
305.	6732	*Clerodendrum tomentosum*			
306.	13689	*Clerodendrum tomentosum var. lanceolatum*			
307.	13690	*Clerodendrum tomentosum var. tomentosum*			
308.	6754	*Dicrastylis cordifolia*			
309.	6910	*Plectranthus intraterraneus*			
310.	35276	*Plectranthus scutellarioides*			
311.	41063	*Quoya loxocarpa*			
312.	41061	*Quoya paniculata*			
313.	6827	*Spartothamnella teucriiflora*			
Lauraceae					
314.	12073	*Cassytha aurea var. aurea*			
315.	2949	*Cassytha capillaris*			
316.	11242	*Cassytha racemosa forma pilosa*			
Liagoraceae					
317.	26837	*Ganonema farinosum*			
318.	26912	*Helminthocladia australis*			
Loganiaceae					
319.	16798	*Logania litoralis*			
Loranthaceae					
320.	2369	*Amyema benthamii*			
321.	2372	*Amyema fitzgeraldii (Pincushion Mistletoe)*			
322.	2380	*Amyema miquelii (Stalked Mistletoe)*			
323.	13266	*Amyema miraculosa subsp. miraculosa*			
324.	2383	*Amyema preissii (Wireleaf Mistletoe)*			
325.	11874	*Amyema sanguinea var. sanguinea*			
Malvaceae					
326.	9080	*Abutilon cunninghamii*			
327.	4891	*Abutilon fraseri (Lantern Bush)*			
328.	11325	*Abutilon indicum var. australiense*			
329.	4895	*Abutilon lepidum*			
330.	4901	*Abutilon otocarpum (Desert Chinese Lantern)*			
331.		*Abutilon sp.*			
332.	14115	*Abutilon sp. Cape Range (A.S. George 1312)*			
333.	42920	*Abutilon sp. Dioicum (A.A. Mitchell PRP 1618)*			
334.	4904	*Alyogyne cuneiformis (Coastal Hibiscus)*			
335.	4907	*Alyogyne pinoniana (Sand Hibiscus)*			
336.	40910	*Androcalva luteiflora (Yellow-flowered Rulingia)*			
337.	12714	*Brachychiton obtusilobus*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
				P4	
338.	18410	*Corchorus carnarvonensis*			
339.	18411	*Corchorus congener*		P3	
340.	13560	*Corchorus crozophorifolius*			
341.		*Corchorus sp.*			
342.	4918	*Gossypium robinsonii (Wild Cotton)*			
343.	4919	*Gossypium sturtianum (Sturt's Desert Rose)*			
344.	11559	*Gossypium sturtianum var. sturtianum*			
345.	17782	*Hannafordia quadrivalvis subsp. recurva*			
346.	4925	*Hibiscus coatesii*			
347.	4930	*Hibiscus goldsworthii*			
348.	4933	*Hibiscus leptocladus*			
349.	4942	*Hibiscus sturtii (Sturt's Hibiscus)*			
350.	4960	*Lawrencia viridigrisea*			
351.	4962	*Malvastrum americanum (Spiked Malvastrum)*	Y		
352.	5051	*Melhania oblongifolia*			
353.	46818	*Seringia hermanniifolia (Crinkle-leaved firebush)*			
354.	4966	*Sida arenicola*			
355.	4970	*Sida calyxhymenia (Tall Sida)*			
356.	4977	*Sida fibulifera (Silver Sida)*			
357.	4982	*Sida kingii*			
358.	18149	*Sida rohlenae subsp. rohlenae*			
359.	4989	*Sida spinosa (Spiny Sida)*			
360.	14694	*Triumfetta clementii*			
361.	13481	*Triumfetta ramosa*			
362.	17529	*Triumfetta tenuiseta*			
363.	5106	*Waltheria indica*			
Marsileaceae					
364.	76	*Marsilea hirsuta (Nardoo)*			
365.		*Marsilea sp.*			
Menispermaceae					
366.	17345	*Tinospora esiangkara*		P2	Y
Montiaceae					
367.	2864	*Calandrinia ptychosperma*			
Moraceae					
368.	19648	*Ficus brachypoda*			
369.	12096	*Ficus virens var. virens*			
Myrtaceae					
370.	35798	*Calothamnus borealis subsp. borealis*			
371.	5484	*Calytrix truncatifolia*			
372.	17093	*Corymbia hamersleyana*			
373.	17092	*Corymbia opaca*			
374.	17084	*Corymbia zygophylla*			
375.	33519	*Eucalyptus baiophylla*			
376.	35345	*Eucalyptus camaldulensis subsp. obtusa (Blunt-budded River Red Gum)*			
377.	5752	*Eucalyptus prominens*			
378.	15597	*Eucalyptus ultima*			
379.	14548	*Eucalyptus victrix*			
380.	15592	*Eucalyptus xerothermica*			
381.	5879	*Melaleuca bracteata (River Teatree)*			
382.	5887	*Melaleuca cardiophylla (Tangling Melaleuca)*			
383.	6010	*Pileanthus limacis (Coastal Coppercups)*			
384.	18260	*Pileanthus septentrionalis*			
385.	6051	*Thryptomene baeckeacea*			
386.	44710	*Thryptomene dampieri*			
387.	6081	*Verticordia forrestii (Forrest's Featherflower)*			
388.	12457	*Verticordia serotina*		P2	
Nyctaginaceae					
389.	2770	*Boerhavia coccinea (Tar Vine, Wituka)*			
390.		*Boerhavia sp.*			
391.	2776	*Commicarpus australis (Perennial Tar Vine)*			
Olacaceae					
392.	2364	*Olax aurantia*			
Oleaceae					
393.	12059	*Jasminum didymum subsp. lineare (Desert Jasmine)*			
394.	29056	*Jasminum sp. Exmouth (G. Marsh 77)*			

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Ophioglossaceae					
395.	16	*Helminthostachys zeylanica*		P3	
396.	12782	*Ophioglossum gramineum*			
397.	17	*Ophioglossum lusitanicum (Adders Tongue)*			
Orchidaceae					
398.	15426	*Pterostylis aspera*			
Orobanchaceae					
399.	12492	*Striga squamigera*			
Phrymaceae					
400.	7082	*Mimulus gracilis*			
Phyllanthaceae					
401.	17626	*Phyllanthus erwinii*			
402.	4677	*Phyllanthus fuernrohrii (Sand Sponge)*		P3	
403.	45696	*Phyllanthus hamelinii (Shark Bay Phyllanthus)*			
404.	4680	*Phyllanthus maderaspatensis*			
405.	4706	*Sauropus crassifolius*			
Pittosporaceae					
406.	19744	*Pittosporum angustifolium*			
407.	41300	*Pittosporum phillyreoides (Weeping Pittosporum, Yaliti)*			
Plantaginaceae					
408.	7098	*Stemodia grossa (Marsh Stemodia, Mindjaara)*			
409.		*Stemodia sp.*			
410.	17295	*Stemodia sp. Onslow (A.A. Mitchell 76/148)*			
411.	7102	*Stemodia viscosa (Pagurda)*			
Plumbaginaceae					
412.	6486	*Aegialitis annulata (Club Mangrove)*			
413.	6490	*Muellerolimon salicorniaceum*			
414.	6491	*Plumbago zeylanica (Native Plumbago)*			
Poaceae					
415.	207	*Aristida contorta (Bunched Kerosene Grass)*			
416.	210	*Aristida holathera*			
417.	12063	*Aristida holathera var. holathera*			
418.	217	*Aristida nitidula (Flat-awned Threeawn)*			
419.	235	*Avena sativa (Common Oat)*	Y		
420.	240	*Bothriochloa ewartiana (Desert Bluegrass)*			
421.	258	*Cenchrus ciliaris (Buffel Grass)*	Y		
422.	266	*Chloris barbata (Purpletop Chloris)*	Y		
423.	273	*Chrysopogon fallax (Golden Beard Grass)*			
424.	279	*Cymbopogon ambiguus (Scentgrass)*			
425.	13741	*Dichanthium sericeum subsp. humilius*			
426.	313	*Digitaria ctenantha (Comb Finger Grass)*			
427.	328	*Echinochloa colona (Awnless Barnyard Grass)*	Y		
428.	357	*Enneapogon caerulescens (Limestone Grass)*			
429.	360	*Enneapogon lindleyanus (Wiry Nineawn, Purple-head Nineawn)*			
430.	375	*Eragrostis cumingii (Cuming's Love Grass)*			
431.	378	*Eragrostis dielsii (Mallee Lovegrass)*			
432.	380	*Eragrostis eriopoda (Woollybutt Grass, Wangurnu)*			
433.	381	*Eragrostis falcata (Sickle Lovegrass)*			
434.	400	*Eriachne aristidea*			
435.	411	*Eriachne helmsii (Buck Wanderrie Grass)*			
436.	413	*Eriachne mucronata (Mountain Wanderrie Grass)*			
437.	414	*Eriachne obtusa (Northern Wandarrie Grass)*			
438.	11011	*Eulalia aurea*			
439.	458	*Iseilema dolichotrichum*			
440.	459	*Iseilema eremaeum*			
441.	503	*Panicum decompositum (Native Millet, Kaltu-kaltu)*			
442.	11232	*Paractaenum novae-hollandiae subsp. novae-hollandiae*			
443.	518	*Paspalidium clementii (Clements Paspalidium)*			
444.	525	*Paspalidium tabulatum*			
445.	606	*Setaria dielsii (Diels' Pigeon Grass)*			
446.	625	*Spinifex longifolius (Beach Spinifex)*			
447.	635	*Sporobolus virginicus (Marine Couch)*			
448.	679	*Triodia angusta*			
449.	680	*Triodia basedowii (Lobed Spinifex)*			
450.	13131	*Triodia epactia*			
451.	17873	*Triodia schinzii*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
452.	704	*Triodia wiseana (Limestone Spinifex)*			
453.	706	*Triraphis mollis (Needle Grass)*			
Polygonaceae					
454.	46434	*Rumex hypogaeus*	Y		
Polyphysaceae					
455.	26442	*Acetabularia calyculus*			
Portulacaceae					
456.	2884	*Portulaca oleracea (Purslane, Wakati)*			
457.		*Portulaca sp.*			
Pottiaceae					
458.	32415	*Pottia scabrifolia*			
Primulaceae					
459.	6484	*Samolus repens (Creeping Brookweed)*			
460.	14026	*Samolus sp. Shark Bay (M.E. Trudgen 7410)*			
Proteaceae					
461.	1799	*Banksia ashbyi (Ashby's Banksia)*			
462.	33400	*Banksia ashbyi subsp. boreoscaia*			
463.	1972	*Grevillea calcicola*		P3	
464.	2001	*Grevillea eriostachya (Flame Grevillea, Kaliny-kalinypa)*			
465.	2012	*Grevillea gordoniana*			
466.	2096	*Grevillea stenobotrya*			
467.	2117	*Grevillea variifolia (Cape Range Grevillea)*			Y
468.	15686	*Grevillea variifolia subsp. bundera*			
469.	15685	*Grevillea variifolia subsp. variifolia*			
470.	2207	*Hakea stenophylla*			
471.	16897	*Hakea stenophylla subsp. stenophylla*			
Pteridaceae					
472.	12796	*Cheilanthes adiantoides*			
473.	31	*Cheilanthes austrotenuifolia*			
474.	37	*Cheilanthes lasiophylla (Woolly Cloak Fern)*			
Rhizophoraceae					
475.	39680	*Ceriops australis*			
476.	5295	*Rhizophora stylosa (Spotted-leaved Red Mangrove)*			
Rhizophyllidaceae					
477.	27186	*Portieria hornemannii*			
Rhodomelaceae					
478.	26453	*Amansia rhodantha*			
479.	26628	*Chondria armata*			
480.	26992	*Kentrophora pectinella*			
481.	46834	*Osmundaria melvillii*			
482.	27171	*Polysiphonia blandii*			
Rhodymeniaceae					
483.	26686	*Coelarthrum opuntia*			
Ricciaceae					
484.		*Riccia bifurca*			
485.		*Riccia limbata*			
486.		*Riccia vesiculosa*			
Rubiaceae					
487.	7338	*Oldenlandia crouchiana*			
488.	18256	*Opercularia spermacocea*			
489.	13339	*Synaptantha tillaeacea var. tillaeacea*			
Ruppiaceae					
490.	114	*Ruppia maritima (Sea Tassel)*			
Rutaceae					
491.	4456	*Diplolaena grandiflora (Wild Rose)*			
Santalaceae					
492.	10977	*Exocarpos aphyllus (Leafless Ballart)*			
493.	10765	*Exocarpos sparteus (Broom Ballart, Djuk)*			
494.	2357	*Santalum lanceolatum (Northern Sandalwood, Yarnguli)*			
Sapindaceae					
495.	11487	*Alectryon oleifolius subsp. oleifolius*			
496.	4745	*Diplopeltis eriocarpa (Hairy Pepperflower)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
497.	4747	*Diplopeltis intermedia*			
498.	11669	*Diplopeltis intermedia var. intermedia*			
Scrophulariaceae					
499.	29715	*Eremophila forrestii subsp. capensis*		P3	
500.	15052	*Eremophila forrestii subsp. forrestii*			
501.	7234	*Eremophila longifolia (Berrigan, Tulypurpa)*			
502.	16363	*Eremophila maculata subsp. brevifolia (Native Fuchsia)*			
503.	15032	*Eremophila occidens*		P2	
504.	16733	*Eremophila setacea*			
505.	23997	*Eremophila tietkensii*			
506.	16040	*Eremophila youngii subsp. lepidota*		P4	
Solanaceae					
507.	47241	*Datura leichhardtii subsp. leichhardtii*	Y		
508.	6966	*Duboisia hopwoodii (Pituri, Kundugu)*			
509.	6974	*Nicotiana glauca (Tree Tobacco)*	Y		
510.	6976	*Nicotiana occidentalis (Native Tobacco)*			
511.	11331	*Nicotiana occidentalis subsp. obliqua*			
512.	11856	*Nicotiana occidentalis subsp. occidentalis*			
513.	6998	*Solanum cleistogamum*			
514.	7002	*Solanum diversiflorum*			
515.	7018	*Solanum lasiophyllum (Flannel Bush, Mindjulu)*			
516.	47173	*Solanum lycopersicum (Tomato)*	Y		
Solieriaceae					
517.	26827	*Eucheuma denticulatum*			
Surianaceae					
518.	3182	*Stylobasium spathulatum (Pebble Bush)*			
Thymelaeaceae					
519.	5230	*Pimelea ammocharis*			
520.	11185	*Pimelea microcephala subsp. microcephala*			
Udoteaceae					
521.	27121	*Penicillus nodulosus*			
Urticaceae					
522.	12670	*Parietaria cardiostegia*			
Valoniaceae					
523.	36143	*Valonia fastigiata*			
524.	46438	*Valonia ventricosa*			
Verbenaceae					
525.	6733	*Lantana camara (Common Lantana)*	Y		
Violaceae					
526.	5215	*Hybanthus aurantiacus*			
527.	5219	*Hybanthus enneaspermus*			
Zygophyllaceae					
528.	4375	*Tribulus cistoides*			
529.	4377	*Tribulus hirsutus*			
530.	4378	*Tribulus hystrix*			
531.	4379	*Tribulus macrocarpus*			
532.	4380	*Tribulus occidentalis (Perennial Caltrop)*			
533.	18072	*Tribulus suberosus*			
534.	4386	*Zygophyllum aurantiacum (Shrubby Twinleaf)*			
535.	4390	*Zygophyllum fruticulosum (Shrubby Twinleaf)*			
536.	4395	*Zygophyllum retivalve*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap
Mapping Western Australia's biodiversity

Naturemap Fauna Report 20 km

Created By Guest user on 01/12/2017

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Vertices 21° 57' 55" S,114° 07' 41" E 22° 09' 41" S,114° 04' 11" E 22° 12' 42" S,114° 05' 11" E
Group By Species Group

Species Group	Species	Records
Amphibian	5	69
Bird	183	2201
Fish	456	1124
Invertebrate	88	1137
Mammal	39	924
Reptile	95	949
TOTAL	**866**	**6404**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Amphibian					
1.	25375	*Cyclorana maini (Sheep Frog)*			
2.	25422	*Neobatrachus aquilonius (Northern Burrowing Frog)*			
3.	25424	*Neobatrachus fulvus (Tawny Trilling Frog)*			
4.	25427	*Neobatrachus sutor (Shoemaker Frog)*			
5.	25432	*Pseudophryne douglasi (Gorge Toadlet)*			
Bird					
6.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
7.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
8.	25536	*Accipiter fasciatus (Brown Goshawk)*			
9.	24282	*Accipiter fasciatus subsp. fasciatus (Brown Goshawk)*			
10.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
11.	25544	*Aegotheles cristatus (Australian Owlet-nightjar)*			
12.	24301	*Aegotheles cristatus subsp. cristatus (Australian Owlet-nightjar)*			
13.	24312	*Anas gracilis (Grey Teal)*			
14.	24316	*Anas superciliosa (Pacific Black Duck)*			
15.	47414	*Anhinga novaehollandiae (Australasian Darter)*			
16.	25634	*Anous stolidus (Common Noddy)*		IA	
17.	24599	*Anthus australis subsp. australis (Australian Pipit)*			
18.	24285	*Aquila audax (Wedge-tailed Eagle)*			
19.	41324	*Ardea modesta (great egret, white egret)*		IA	
20.	24341	*Ardea pacifica (White-necked Heron)*			
21.	24343	*Ardea sacra subsp. sacra (Eastern Reef Egret, Eastern Reef Heron)*			
22.		*Ardenna pacifica*			
23.	24610	*Ardeotis australis (Australian Bustard)*			
24.	25736	*Arenaria interpres (Ruddy Turnstone)*		IA	
25.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
26.	24352	*Artamus cinereus subsp. melanops (Black-faced Woodswallow)*			
27.	25567	*Artamus leucorynchus (White-breasted Woodswallow)*			
28.	24354	*Artamus leucorynchus subsp. leucopygialis (White-breasted Woodswallow)*			
29.	24355	*Artamus minor (Little Woodswallow)*			
30.	24356	*Artamus personatus (Masked Woodswallow)*			
31.		*Barnardius zonarius*			
32.	47897	*Butorides striata (Striated Heron, Mangrove Heron)*			
33.	25716	*Cacatua sanguinea (Little Corella)*			
34.	24727	*Cacatua sanguinea subsp. westralensis (Little Corella)*			
35.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
36.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
37.	24269	*Calamanthus campestris (Rufous Fieldwren)*			
38.		*Calamanthus campestris subsp. campestris*			Y
39.	24779	*Calidris acuminata (Sharp-tailed Sandpiper)*		IA	
40.	24780	*Calidris alba (Sanderling)*		IA	

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
41.	24784	*Calidris ferruginea (Curlew Sandpiper)*		T	
42.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
43.	24789	*Calidris subminuta (Long-toed Stint)*		IA	
44.	24564	*Certhionyx variegatus (Pied Honeyeater)*			
45.	25575	*Charadrius leschenaultii (Greater Sand Plover)*		IA	
46.	25576	*Charadrius mongolus (Lesser Sand Plover)*		T	
47.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
48.	47909	*Cheramoeca leucosterna (White-backed Swallow)*			
49.	41332	*Chlidonias leucopterus (White-winged Black Tern)*		IA	
50.		*Chroicocephalus novaehollandiae*			
51.	24431	*Chrysococcyx basalis (Horsfield's Bronze Cuckoo)*			
52.	24288	*Circus approximans (Swamp Harrier)*			
53.	24289	*Circus assimilis (Spotted Harrier)*			
54.	24612	*Colluricincla harmonica subsp. kolichisi (Grey Shrike-thrush)*			
55.	24613	*Colluricincla harmonica subsp. rufiventris (Grey Shrike-thrush)*			
56.	24399	*Columba livia (Domestic Pigeon)*	Y		
57.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
58.	24362	*Coracina novaehollandiae subsp. novaehollandiae (Black-faced Cuckoo-shrike)*			
59.	24363	*Coracina novaehollandiae subsp. subpallida (Black-faced Cuckoo-shrike)*			
60.	24416	*Corvus bennetti (Little Crow)*			
61.	25593	*Corvus orru (Torresian Crow)*			
62.	24671	*Coturnix pectoralis (Stubble Quail)*			
63.	25701	*Coturnix ypsilophora (Brown Quail)*			
64.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
65.	25595	*Cracticus tibicen (Australian Magpie)*			
66.	25596	*Cracticus torquatus (Grey Butcherbird)*			
67.	24322	*Cygnus atratus (Black Swan)*			
68.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
69.	24441	*Dicaeum hirundinaceum subsp. hirundinaceum (Mistletoebird)*			
70.	24470	*Dromaius novaehollandiae (Emu)*			
71.		*Egretta garzetta*			
72.		*Egretta novaehollandiae*			
73.		*Elanus axillaris*			
74.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
75.	24631	*Emblema pictum (Painted Finch)*			
76.		*Eolophus roseicapillus*			
77.	24653	*Eopsaltria pulverulenta (Mangrove Robin)*			
78.	24570	*Epthianura tricolor (Crimson Chat)*			
79.	24837	*Eremiornis carteri (Spinifex-bird)*			
80.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
81.	47938	*Esacus magnirostris (Beach Stone-curlew, Beach Thick-knee)*			
82.	25621	*Falco berigora (Brown Falcon)*			
83.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
84.	25623	*Falco longipennis (Australian Hobby)*			
85.	25727	*Fulica atra (Eurasian Coot)*			
86.	25730	*Gallirallus philippensis (Buff-banded Rail)*			
87.	24765	*Gallirallus philippensis subsp. mellori (Buff-banded Rail)*			
88.	42314	*Gavicalis virescens (Singing Honeyeater)*			
89.	47954	*Gelochelidon nilotica (Gull-billed Tern)*		IA	
90.	24401	*Geopelia cuneata (Diamond Dove)*			
91.	24402	*Geopelia humeralis (Bar-shouldered Dove)*			
92.	25585	*Geopelia striata (Zebra Dove)*			
93.	24404	*Geophaps plumifera (Spinifex Pigeon)*			
94.	25530	*Gerygone fusca (Western Gerygone)*			
95.	24276	*Gerygone tenebrosa (Dusky Gerygone)*			
96.	24481	*Glareola maldivarum (Oriental Pratincole)*		IA	
97.	24443	*Grallina cyanoleuca (Magpie-lark)*			
98.	24484	*Grus rubicunda (Brolga)*			
99.	25627	*Haematopus fuliginosus (Sooty Oystercatcher)*			
100.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
101.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*			
102.	25541	*Haliastur indus (Brahminy Kite)*			
103.	24295	*Haliastur sphenurus (Whistling Kite)*			
104.	24297	*Hamirostra melanosternon (Black-breasted Buzzard)*			
105.	47965	*Hieraaetus morphnoides (Little Eagle)*			
106.	25734	*Himantopus himantopus (Black-winged Stilt)*			
107.	24491	*Hirundo neoxena (Welcome Swallow)*			
108.		*Hydroprogne caspia*			
109.	25638	*Larus pacificus (Pacific Gull)*			
110.	25661	*Lichmera indistincta (Brown Honeyeater)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
111.	24582	*Lichmera indistincta subsp. indistincta (Brown Honeyeater)*			
112.	30932	*Limosa lapponica (Bar-tailed Godwit)*		IA	
113.	25741	*Limosa limosa (Black-tailed Godwit)*		IA	
114.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
115.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
116.	24549	*Malurus leucopterus subsp. leuconotus (White-winged Fairy-wren)*			
117.	24583	*Manorina flavigula (Yellow-throated Miner)*			
118.	47997	*Melanodryas cucullata (Hooded Robin)*			
119.	24736	*Melopsittacus undulatus (Budgerigar)*			
120.	24598	*Merops ornatus (Rainbow Bee-eater)*		IA	
121.		*Microcarbo melanoleucos*			
122.	25542	*Milvus migrans (Black Kite)*			
123.	25545	*Mirafra javanica (Horsfield's Bushlark, Singing Bushlark)*			
124.	25685	*Neochmia ruficauda (Star Finch)*			
125.	24798	*Numenius madagascariensis (Eastern Curlew)*		T	
126.	24799	*Numenius minutus (Little Curlew)*		IA	
127.	25742	*Numenius phaeopus (Whimbrel)*		IA	
128.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
129.	24742	*Nymphicus hollandicus (Cockatiel)*			
130.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
131.	24618	*Oreoica gutturalis (Crested Bellbird)*			
132.	34012	*Oreoica gutturalis subsp. pallescens (Crested Bellbird, central)*			
133.	24620	*Pachycephala lanioides (White-breasted Whistler)*			
134.	25678	*Pachycephala melanura (Mangrove Golden Whistler)*			
135.	24621	*Pachycephala melanura subsp. melanura (Mangrove Golden Whistler)*			
136.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
137.		*Pandion cristatus*			
138.	24627	*Pardalotus rubricatus (Red-browed Pardalote)*			
139.	25682	*Pardalotus striatus (Striated Pardalote)*			
140.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
141.	48060	*Petrochelidon ariel (Fairy Martin)*			
142.	48061	*Petrochelidon nigricans (Tree Martin)*			
143.	24662	*Phaethon lepturus (White-tailed Tropicbird)*		IA	
144.	25697	*Phalacrocorax carbo (Great Cormorant)*			
145.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
146.	25699	*Phalacrocorax varius (Pied Cormorant)*			
147.	24751	*Platycercus zonarius subsp. zonarius (Port Lincoln Parrot)*			
148.	24382	*Pluvialis fulva (Pacific Golden Plover)*		IA	
149.	24383	*Pluvialis squatarola (Grey Plover)*		IA	
150.	25703	*Podargus strigoides (Tawny Frogmouth)*			
151.	24679	*Podargus strigoides subsp. brachypterus (Tawny Frogmouth)*			
152.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
153.	25706	*Pomatostomus temporalis (Grey-crowned Babbler)*			
154.	24390	*Psophodes occidentalis (Western Wedgebill, Chiming Wedgebill)*			
155.	25711	*Pterodroma mollis (Soft-plumaged Petrel)*			
156.		*Ptilonorhynchus guttatus*			
157.	24757	*Ptilonorhynchus maculatus subsp. guttatus (Western Bowerbird)*			
158.	42323	*Ptilotula keartlandi (Grey-headed Honeyeater)*			
159.	24715	*Puffinus huttoni (Hutton's Shearwater)*		T	
160.	24278	*Pyrrholaemus brunneus (Redthroat)*			
161.	48096	*Rhipidura albiscapa (Grey Fantail)*			
162.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
163.	24454	*Rhipidura leucophrys subsp. leucophrys (Willie Wagtail)*			
164.	24457	*Rhipidura phasiana (Mangrove Grey Fantail)*			
165.	30948	*Smicrornis brevirostris (Weebill)*			
166.	24521	*Sterna bengalensis (Lesser Crested Tern)*			
167.	25640	*Sterna dougallii (Roseate Tern)*		IA	
168.		*Sternula albifrons*			
169.	25656	*Stipiturus ruficeps (Rufous-crowned Emu-wren)*			
170.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
171.	30870	*Taeniopygia guttata (Zebra Finch)*			
172.	34007	*Thalassarche chlororhynchos (Atlantic Yellow-nosed Albatross)*		T	
173.		*Thalasseus bengalensis*			
174.		*Thalasseus bergii*			
175.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
176.	25548	*Todiramphus chloris (Collared Kingfisher)*			
177.	24306	*Todiramphus chloris subsp. pilbara (Pilbara Collared Kingfisher)*			
178.	42351	*Todiramphus pyrrhopygius (Red-backed Kingfisher)*			
179.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
180.	24803	*Tringa brevipes (Grey-tailed Tattler)*		IA	

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
181.	24806	*Tringa glareola (Wood Sandpiper)*		IA	
182.	24808	*Tringa nebularia (Common Greenshank, greenshank)*		IA	
183.	24809	*Tringa stagnatilis (Marsh Sandpiper, little greenshank)*		IA	
184.	24851	*Turnix velox (Little Button-quail)*			
185.	24386	*Vanellus tricolor (Banded Lapwing)*			
186.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			
187.	24857	*Zosterops luteus (Yellow White-eye)*			
188.		*Zosterops luteus subsp. balstoni*			

Fish

189.		*? ?*			
190.		*Ablabys taenianotus*			
191.		*Abudefduf bengalensis*			
192.		*Acanthocepola abbreviata*			
193.		*Acanthopagrus latus*			
194.		*Adventor elongatus*			
195.		*Albula forsteri*			
196.		*Alectis ciliaris*			
197.		*Alectis indica*			
198.		*Alepes apercna*			
199.		*Aluterus scriptus*			
200.		*Ambassis vachellii*			
201.		*Amblyeleotris wheeleri*			
202.		*Amblygobius phalaena*			
203.		*Amphiprion perideraion*			
204.		*Amphiprion rubrocinctus*			
205.		*Anacanthus barbatus*			
206.		*Anampses caeruleopunctatus*			
207.		*Anampses meleagrides*			
208.		*Antennarius nummifer*			
209.		*Apistus carinatus*			
210.		*Apogon angustatus*			
211.		*Apogon argyrogaster*			
212.		*Apogon brevicaudatus*			
213.		*Apogon cookii*			
214.		*Apogon fasciatus*			
215.		*Apogon fraenatus*			
216.		*Apogon multilineatus*			Y
217.		*Apogon nigripinnis*			
218.		*Apogon pallidofasciatus*			
219.		*Apogon poecilopterus*			
220.		*Apogon rueppellii*			
221.		*Apogon semiornatus*			
222.		*Apogon septemstriatus*			
223.		*Apogon sp.*			
224.		*Apogon taeniophorus*			
225.		*Apogon timorensis*			
226.		*Apolemichthys trimaculatus*			
227.		*Archamia fucata*			
228.		*Argyrosomus japonicus*			
229.		*Arius thalassinus*			
230.		*Arothron manilensis*			
231.		*Arothron stellatus*			
232.		*Aseraggodes sp.*			
233.		*Aseraggodes whitleyi*			
234.		*Aspidontus taeniatus*			
235.		*Assiculus punctatus*			
236.		*Asterropteryx semipunctatus*			
237.		*Atelomycterus fasciatus*			
238.		*Atherinomorus vaigiensis*			
239.		*Bathygobius fuscus*			
240.		*Bathygobius laddi*			
241.		*Batrachomoeus sp.*			
242.		*Belone sp.*			
243.		*Belonepterygion fasciolatum*			
244.		*Blenniella chrysospilos*			
245.		*Bodianus axillaris*			
246.		*Bodianus bilunulatus*			
247.		*Brachysomophis cirrocheilos*			
248.		*Callionymus grossi*			
249.		*Callionymus sublaevis*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
250.		*Cantherhines pardalis*			
251.		*Canthigaster coronata*			
252.		*Canthigaster janthinoptera*			
253.		*Carangoides caeruleopinnatus*			
254.		*Carangoides chrysophrys*			
255.		*Carangoides coeruleopinnatus*			
256.		*Carangoides hedlandensis*			
257.		*Carangoides humerosus*			
258.		*Carangoides malabaricus*			
259.		*Carangoides talamparoides*			
260.		*Caranx bucculentus*			
261.		*Caranx sexfasciatus*			
262.		*Carcharhinus cautus*			
263.		*Carcharhinus sp.*			
264.	34031	*Carcharodon carcharias (Great White Shark)*		T	
265.		*Centriscus cristatus*			
266.		*Centriscus scutatus*			
267.		*Centrogenys vaigiensis*			
268.		*Centrolophus niger*			
269.		*Centropyge eibli*			
270.		*Centropyge tibicen*			
271.		*Cephalopholis boenak*			
272.		*Cephalopholis sonnerati*			
273.		*Chaetodermis penicilligera*			
274.		*Chaetodon adiergastos*			
275.		*Chaetodon assarius*			
276.		*Chaetodon lunula*			
277.		*Chaetodon punctatofasciatus*			
278.		*Chaetodon trifascialis*			
279.		*Chaetodontoplus duboulayi*			
280.		*Chanos chanos*			
281.		*Cheilinus chlorourus*			
282.		*Cheilio inermis*			
283.		*Chelmon marginalis*			
284.		*Chelonodon patoca*			
285.		*Chiloscyllium punctatum*			
286.		*Chirocentrus dorab*			
287.		*Choerodon cauteroma*			
288.		*Choerodon cephalotes*			
289.		*Choerodon sp.*			
290.		*Choerodon vitta*			
291.		*Chromis fumea*			
292.		*Chromis margaritifer*			
293.		*Chromis weberi*			
294.		*Chromis westaustralis*			
295.		*Cirrhilabrus randalli*			
296.		*Cirrhilabrus sp.*			
297.		*Cirrhimuraena calamus*			
298.		*Cirrhitichthys oxycephalus*			
299.		*Cirrhitus pinnulatus*			
300.		*Cirripectes filamentosus*			
301.		*Cirripectes hutchinsi*			
302.		*Conger cinereus*			
303.		*Conger sp.*			
304.		*Congrogadus malayanus*			Y
305.		*Congrogadus spinifer*			
306.		*Coradion chrysozonus*			
307.		*Coris aygula*			
308.		*Coris caudimacula*			
309.		*Coryphaena hippurus*			
310.		*Coryphopterus duospilus*			
311.		*Coryphopterus sp.*			
312.		*Craterocephalus mugiloides*			
313.		*Craterocephalus pauciradiatus*			
314.		*Cryptocentrus sp.*			
315.		*Ctenochaetus strigosus*			
316.		*Cymbacephalus nematophthalmus*			
317.		*Cynoglossus sp.*			
318.		*Dactyloptena orientalis*			
319.		*Dactyloptena papilio*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
320.		*Dactylopus dactylopus*			
321.		*Dascyllus reticulatus*			
322.		*Dascyllus trimaculatus*			
323.		*Dasyatis kuhlii*			
324.		*Decapterus macrosoma*			
325.		*Decapterus russelli*			
326.		*Dendrochirus brachypterus*			
327.		*Dexillus muelleri*			
328.		*Diademichthys lineatus*			
329.		*Diodon sp.*			
330.		*Echeneis naucrates*			
331.		*Ecsenius bicolor*			
332.		*Ecsenius lineatus*			
333.		*Ecsenius oculatus*			
334.		*Ecsenius yaeyamaensis*			
335.		*Elops hawaiensis*			
336.		*Engyprosopon sp.*			
337.		*Enneapterygius gracilis*			
338.		*Enneapterygius tutuilae*			
339.		*Entomacrodus thalassinus*			
340.		*Epinephelus bilobatus*			
341.		*Epinephelus coioides*			
342.		*Epinephelus rivulatus*			
343.		*Epinephelus sexfasciatus*			
344.		*Epinephelus sp.*			
345.		*Equulites moretoniensis*			
346.		*Eubalichthys caeruleoguttatus*			
347.		*Euristhmus nudiceps*			
348.		*Eviota bipunctata*			Y
349.		*Eviota sp.*			
350.		*Exallias brevis*			
351.		*Feroxodon multistriatus*			
352.		*Fistularia petimba*			
353.		*Foa sp.*			Y
354.		*Gambusia holbrooki*			
355.		*Gazza minuta*			
356.		*Gerres oblongus?*			Y
357.		*Gerres sp.*			
358.		*Gerres subfasciatus*			
359.		*Glaucosoma magnificum*			
360.		*Gnathanodon speciosus*			
361.		*Gobiodon axillaris*			
362.		*Gobiodon citrinus*			
363.		*Grammatobothus polyophthalmus*			
364.		*Grammistes sexlineatus*			
365.		*Gymnocranius griseus*			
366.		*Gymnothorax buroensis*			
367.		*Gymnothorax nudivomer*			Y
368.		*Gymnothorax pseudothyrsoideus*			
369.		*Gymnothorax undulatus*			
370.		*Gymnothorax zonipectis*			
371.		*Gymnura australis*			
372.		*Halicampus grayi*			
373.		*Halicampus spinirostris*			Y
374.		*Halichoeres biocellatus*			
375.		*Halichoeres margaritaceus*			
376.		*Halichoeres melanochir*			
377.		*Halophryne diemensis*			
378.		*Halophryne ocellatus*			
379.		*Helcogramma decurrens*			
380.		*Helcogramma striata*			
381.		*Hemigaleus sp.*			
382.		*Heniochus acuminatus*			
383.		*Herklotsichthys blackburni*			
384.		*Herklotsichthys koningsbergeri*			
385.		*Hologymnosus annulatus*			
386.		*Hypnos monopterygium*			
387.		*Hypoatherina temminckii*			
388.		*Ichthyscopus insperatus*			
389.		*Inegocia japonica*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
390.		*Inimicus sinensis*			
391.		*Istiblennius edentulus*			
392.		*Istiblennius meleagris*			
393.		*Istiophorus platypterus*			
394.		*Labroides dimidiatus*			
395.		*Lactoria cornuta*			
396.		*Lactoria fornasini*			
397.		*Lagocephalus sceleratus*			
398.		*Leiognathus bindus*			
399.		*Leiognathus leuciscus*			
400.		*Leiognathus sp.*			
401.		*Lepidotrigla sp.*			
402.		*Leptoscarus vaigiensis*			
403.		*Lethrinus genivittatus*			
404.		*Lethrinus laticaudis*			
405.		*Lethrinus miniatus*			
406.		*Lethrinus nebulosus*			
407.		*Lethrinus punctulatus*			
408.		*Lethrinus rubrioperculatus*			
409.		*Lethrinus sp.*			
410.		*Liachirus whitleyi*			Y
411.		*Limnichthys fasciatus*			
412.		*Liocranium praepositum*			
413.		*Liza alata*			
414.		*Liza sp.*			
415.		*Lophiocharon trisignatus*			
416.		*Lutjanus carponotatus*			
417.		*Lutjanus erythropterus*			
418.		*Lutjanus fulviflamma*			
419.		*Lutjanus malabaricus*			
420.		*Lutjanus vitta*			
421.		*Macropharyngodon negrosensis*			
422.		*Macropharyngodon ornatus*			
423.		*Megalaspis cordyla*			
424.		*Mene maculata*			
425.		*Metavelifer multiradiatus*			
426.		*Microcanthus strigatus*			
427.	34025	*Milyeringa veritas (Cave Gudgeon)*		T	
428.		*Minous sp.*			
429.		*Minous versicolor*			
430.		*Monacanthus chinensis*			
431.		*Monocentris japonicus*			
432.		*Monodactylus argenteus*			
433.		*Mugil cephalus*			
434.		*Myripristis murdjan*			
435.		*Narcine westraliensis*			
436.		*Naso brevirostris*			
437.		*Nectamia fusca*			
438.		*Nectamia savayensis*			
439.		*Nemipterus peronii*			
440.		*Neopomacentrus azysron*			
441.		*Neopomacentrus cyanomos*			
442.		*Norfolkia brachylepis*			
443.		*Norfolkia sp.*			
444.		*Notograptus guttatus*			
445.		*Omobranchus germaini*			
446.		*Omobranchus rotundiceps*			
447.		*Ophichthus celebicus?*			
448.	34038	*Ophisternon candidum (Blind Cave Eel)*		T	
449.		*Opistognathus darwiniensis*			
450.		*Opistognathus inornatus*			
451.		*Oplopomus sp.*			Y
452.		*Ostracion cubicus*			
453.		*Ostracion meleagris*			
454.		*Oxycheilinus unifasciatus*			
455.		*Paracentropogon vespa*			
456.		*Parachaetodon ocellatus*			
457.		*Parachaeturichthys polynema*			
458.		*Paracirrhites arcatus*			
459.		*Paracirrhites forsteri*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
460.		*Paramonacanthus choirocephalus*			
461.		*Parapercis diplospilus*			
462.		*Parapercis millepunctata*			
463.		*Parapercis multiplicata*			
464.		*Parapercis nebulosa*			
465.		*Paraplagusia bilineata*			
466.		*Paraplotosus albilabris*			
467.		*Paraplotosus butleri*			
468.		*Parapriacanthus ransonneti*			
469.		*Parascolopsis sp.*			
470.		*Parascorpaena picta*			
471.		*Parastromateus niger*			
472.		*Parupeneus barberinoides*			
473.		*Parupeneus sp.*			
474.		*Parupeneus spilurus*			
475.		*Pataecus sp.*			
476.		*Pegasus volitans*			
477.		*Pelates quadrilineatus*			
478.		*Pelates sexlineatus*			
479.		*Pellona ditchela*			
480.		*Pempheris mangula*			
481.		*Pempheris n.sp*			
482.		*Pempheris ypsilychnus*			
483.		*Pentapodus emeryii*			
484.		*Pentapodus porosus*			
485.		*Pentapodus sp.*			
486.		*Pentapodus vitta*			
487.		*Periophthalmus argentilineatus*			
488.		*Peristrominous dolosus*			
489.		*Pervagor janthinosoma*			
490.		*Petroscirtes breviceps*			
491.		*Petroscirtes mitratus*			
492.		*Plagiotremus rhinorhynchos*			
493.		*Platax batavianus*			
494.		*Platax sp.*			
495.		*Platycephalus arenarius*			
496.		*Platycephalus endrachtensis*			
497.		*Plectorhinchus flavomaculatus*			
498.		*Plectorhinchus pictus*			
499.		*Plectorhinchus unicolor*			
500.		*Plectroglyphidodon lacrymatus*			
501.		*Plectroglyphidodon leucozonus*			
502.		*Plectropomus maculatus*			
503.		*Plesiops coeruleolineatus*			
504.		*Plotosus lineatus*			
505.		*Poecilia reticulata*			
506.		*Polydactylus multiradiatus*			
507.		*Polydactylus plebius*			
508.		*Pomacanthus semicirculatus*			
509.		*Pomacentrus milleri*			
510.		*Pomacentrus moluccensis*			
511.		*Pomacentrus nagasakiensis*			
512.		*Pomacentrus sp.*			
513.		*Pomacentrus vaiuli*			
514.		*Pomadasys argenteus*			
515.		*Pomadasys maculatus*			
516.		*Priacanthus hamrur*			
517.		*Priacanthus tayenus*			
518.		*Priolepis cincta*			
519.		*Priolepis nuchifasciata*			
520.	34037	*Pristis zijsron (Green Sawfish)*		T	
521.		*Pristotis obtusirostris*			
522.		*Psammodiscus ocellatus*			
523.		*Psammoperca waigiensis*			
524.		*Psenes seriollela?*			Y
525.		*Psettodes erumei*			
526.		*Pseudanthias cooperi*			
527.		*Pseudocalliurichthys goodladi*			
528.		*Pseudocaranx dentex*			
529.		*Pseudochromis fuscus*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
530.		*Pseudochromis marshallensis*			
531.		*Pseudochromis tapeinosoma*			
532.		*Pseudogramma polyacanthum*			
533.		*Pseudojuloides elongatus*			
534.		*Pseudomonacanthus peroni*			
535.		*Pseudoplesiops rosae*			
536.		*Pseudorhombus arsius*			
537.		*Pseudorhombus dupliciocellatus*			
538.		*Pseudorhombus jenynsii*			
539.		*Pseudorhombus sp.*			
540.		*Pteragogus enneacanthus*			
541.		*Pterapogon mirifica*			
542.		*Ptereleotris evides*			
543.		*Pterois antennata*			
544.		*Pterois russelli*			
545.		*Pterois volitans*			
546.		*Rachycentron canadum*			
547.		*Rainfordia opercularis*			
548.		*Ranzania laevis*			
549.		*Rastrelliger kanagurta*			
550.		*Rhabdamia cypselurus*			
551.		*Rhabdamia gracilis*			
552.		*Rhabdosargus sarba*			
553.	42358	*Rhincodon typus (Whale Shark)*		S	
554.		*Rhinecanthus aculeatus*			
555.		*Rhynchobatus djiddensis*			
556.		*Rhynchostracion nasus*			
557.		*Salarias fasciatus*			
558.		*Salarias sexfilum*			
559.		*Saurida argentea*			
560.		*Saurida gracilis*			
561.		*Saurida grandisquamis*			
562.		*Saurida nebulosa*			
563.		*Saurida undosquamis*			
564.		*Scaevius milii*			
565.		*Scarus aeruginosus*			Y
566.		*Scolopsis monogramma*			
567.		*Scolopsis sp.*			
568.		*Scolopsis taenioptera*			
569.		*Scomberoides commersonnianus*			
570.		*Scomberoides lysan*			
571.		*Scomberomorus commerson*			
572.		*Scomberomorus queenslandicus*			
573.		*Scorpaenodes guamensis*			
574.		*Scorpaenodes sp.*			
575.		*Scorpaenodes varipinnis*			
576.		*Scorpaenopsis diabolus*			
577.		*Scorpaenopsis papuensis*			
578.		*Secutor insidiator*			
579.		*Secutor interruptus*			
580.		*Selar sp.*			
581.		*Selaroides leptolepis*			
582.		*Selenotoca multifasciata*			
583.		*Seriolina nigrofasciata*			
584.		*Siganus fuscescens*			
585.		*Siganus sp.*			
586.		*Siganus spinus*			
587.		*Siganus trispilos*			
588.		*Sillago analis*			
589.		*Sillago burrus*			
590.		*Sillago lutea*			
591.		*Sillago maculata*			
592.		*Sillago sp.*			
593.		*Sphyraena barracuda*			
594.		*Sphyraena obtusata*			
595.		*Stanulus talboti*			
596.		*Stegastes fasciolatus*			
597.		*Stegastes obreptus*			
598.		*Stethojulis bandanensis*			
599.		*Stethojulis strigiventer*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
600.		*Suezichthys cyanolaemus*			
601.		*Suggrundus sp.*			
602.		*Synanceia horrida*			
603.		*Synodus hoshinonis?*			Y
604.		*Synodus sp.*			
605.		*Synodus variegatus*			
606.		*Taenioides buchanani*			Y
607.		*Terapon jarbua*			
608.		*Terapon puta*			
609.		*Terapon theraps*			
610.		*Thalassoma hardwicke*			
611.		*Thalassoma lunare*			
612.		*Thalassoma lutescens*			
613.		*Thryssa hamiltonii*			
614.		*Thryssa mystax?*			
615.		*Thryssa setirostris*			
616.		*Torquigener pallimaculatus*			
617.		*Torquigener tuberculiferus*			
618.		*Torquigener whitleyi*			
619.		*Trachinocephalus myops*			
620.		*Trachinotus blochii*			
621.		*Trachurus novaezelandiae*			
622.		*Trachyrhamphus longirostris*			Y
623.		*Tragulichthys jaculiferus*			
624.		*Tragulichthys sp.*			Y
625.		*Triacanthus biaculeatus*			
626.		*Triacanthus sp.*			
627.		*Trichiurus sp.*			
628.		*Trimma lantana*			
629.		*Trimma okinawae*			
630.		*Tylosurus crocodilus*			
631.		*Upeneus sp.*			
632.		*Upeneus tragula*			
633.		*Upeneus vittatus*			
634.		*Uraspis secunda*			Y
635.		*Valamugil buchanani*			
636.		*Valenciennea muralis*			
637.		*Velifer hypselopterus*			
638.		*Xenojulis margaritaceous*			
639.		*Xiphasia setifer*			
640.		*Yongeichthys criniger*			
641.		*Yongeichthys nebulosus*			
642.		*Zabidius novemaculeatus*			
643.		*Zebrias cancellatus*			
644.		*Zebrias quagga*			

Invertebrate

645.		*Amblyomma calabyi*			Y
646.		*Amblyomma triguttatum*			
647.		*Anapistula troglobia*			Y
648.		*Antichiropus sp.*			
649.		*Argiope protensa*			
650.		*Argiope trifasciata*			
651.		*Artema atlanta*			
652.		*Asadipus barlee*			
653.		*Asadipus cape*			
654.		*Australoschendyla capensis*			Y
655.		*Austrochthonius easti*			
656.		*Backobourkia collina*			
657.	33905	*Bamazomus subsolanus (Eastern Cape Range Bamazomus)*		T	Y
658.	33906	*Bamazomus vespertinus (Western Cape Range Bamazomus)*		T	Y
659.		*Bengalla bertmaini*			Y
660.		*Boreohesperus capensis*			
661.		*Cercophonius granulosus*			
662.		*Chthiononetes tenuis*			
663.		*Cormocephalus aurantiipes*			
664.		*Cormocephalus strigosus*			
665.		*Cosmophasis baehrae*			
666.		*Crossopriza lyoni*			
667.		*Cryptoerithus harveyi*			
668.		*Cyclosa camelodes*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
669.		*Cyrtobill darwini*			
670.		*Dampetrus isolatus*			Y
671.	33907	*Draculoides brooksi (Northern Cape Range Draculoides)*		T	Y
672.	33909	*Draculoides julianneae (Western Cape Range Draculoides)*		T	Y
673.	33915	*Draculoides vinei (Cape Range Draculoides)*		P4	
674.		*Dunedinia occidentalis*			Y
675.		*Ethmostigmus rubripes*			
676.		*Euasteron ursulae*			
677.		*Glennhuntia glennhunti*			Y
678.		*Heteropoda hermitis*			
679.		*Heurodes turritus*			
680.		*Hoggicosa snelli*			
681.		*Ideoblothrus papillon*			Y
682.		*Ideoblothrus woodi*			Y
683.	34145	*Indohya damocles (Cameron's Cave Pseudoscorpion)*		T	Y
684.		*Indohya humphreysi*			Y
685.		*Indolpium sp.*			
686.		*Isopedella tindalei*			
687.		*Jalmenus clementi*			Y
688.		*Lampona quinqueplagiata*			
689.		*Lamponega forceps*			Y
690.		*Lamponina scutata*			
691.		*Latrodectus hasseltii*			
692.		*Leptasteron platyconductor*			
693.		*Leptus waldockae*			Y
694.		*Lychas mjobergi*			
695.		*Masasteron gracilis*			
696.		*Masasteron sampeyae*			
697.		*Missulena occatoria*			
698.		*Miturga occidentalis*			
699.		*Nephila edulis*			
700.		*Nephila plumipes*			
701.	33985	*Nocticola flabella (Cape Range Blind Cockroach)*		P2	Y
702.		*Nomindra leeuweni*			
703.		*Notsodipus bidgemia*			
704.		*Notsodipus capensis*			
705.		*Ocrisiona leucocomis*			
706.		*Oreo capensis*			
707.		*Ornithodoros gurneyi*			
708.		*Prethopalpus alexanderi*			Y
709.		*Prethopalpus infernalis*			Y
710.		*Pseudolampona marun*			Y
711.		*Rhagada capensis*			
712.		*Scolopendra morsitans*			
713.		*Storena sinuosa*			
714.	33963	*Stygiocaris lancifera (Lance-beaked Cave Shrimp)*		T	
715.	33964	*Stygiocaris stylifera (Spear-beaked Cave Shrimp)*		P4	
716.		*Stygiochiropus communis*			
717.	33967	*Stygiochiropus isolatus (millipede)*		T	Y
718.	33968	*Stygiochiropus peculiaris (Cameron's Cave Millipede)*		T	Y
719.	33969	*Stygiochiropus sympatricus (millipede)*		T	Y
720.		*Tetragnatha demissa*			
721.		*Thereuopoda lesueurii*			
722.		*Trachyspina capensis*			
723.		*Trichocyclus nigropunctatus*			
724.		*Trichocyclus septentrionalis*			Y
725.		*Tuoba sydneyensis*			
726.		*Tyrannochthonius brooksi*			Y
727.		*Tyrannochthonius butleri*			Y
728.		*Urodacus hoplurus*			
729.		*Wandella waldockae*			
730.		*Wesmaldra learmonth*			
731.		*Wydundra kennedy*			
732.		*Yardiella humphreysi*			Y

Mammal

733.	24161	*Bettongia lesueur subsp. graii (Boodie (inland), Burrowing Bettong (inland))*		X	
734.	24251	*Bos taurus (European Cattle)*	Y		
735.	24039	*Canis lupus subsp. dingo (Dingo)*	Y		
736.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
737.	24091	*Dasykaluta rosamondae (Little Red Kaluta)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
738.	24084	*Dugong dugon (Dugong)*		S	
739.	24043	*Eubalaena australis (Southern Right Whale)*		T	
740.	24041	*Felis catus (Cat)*	Y		
741.	24054	*Globicephala macrorhynchus (Short-finned Pilot Whale)*			
742.	24218	*Leporillus apicalis (Lesser Stick-nest Rat)*		X	
743.	24135	*Macropus robustus subsp. erubescens (Euro, Biggada)*			
744.	24136	*Macropus rufus (Red Kangaroo, Marlu)*			
745.	24051	*Megaptera novaeangliae (Humpback Whale)*		S	
746.	24222	*Mesembriomys macrurus (Golden-backed Tree-rat)*		P4	
747.	24213	*Mirounga leonina (Southern Elephant Seal)*			
748.	24223	*Mus musculus (House Mouse)*	Y		
749.	24095	*Ningaui timealeyi (Pilbara Ningaui)*			
750.	24224	*Notomys alexis (Spinifex Hopping-mouse)*			
751.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
752.	24060	*Orcaella heinsohni (Australian Snubfin Dolphin)*		P4	
753.	24085	*Oryctolagus cuniculus (Rabbit)*	Y		
754.	24142	*Petrogale lateralis subsp. lateralis (Black-flanked Rock-wallaby, Black-footed Rock-wallaby)*		T	
755.	24098	*Phascogale calura (Red-tailed Phascogale, Kenngoor)*		S	
756.	24164	*Potorous platyops (Broad-faced Potoroo)*		X	
757.	24105	*Pseudantechinus roryi (Rory's Pseudantechinus)*			
758.	24233	*Pseudomys chapmani (Western Pebble-mound Mouse, Ngadji)*		P4	
759.	24236	*Pseudomys fieldi (Shark Bay Mouse, Djoongari)*		T	
760.	24237	*Pseudomys hermannsburgensis (Sandy Inland Mouse)*			
761.	24172	*Pteropus alecto (Black Flying-fox)*			
762.	24173	*Pteropus scapulatus (Little Red Flying-fox)*			
763.	24245	*Rattus rattus (Black Rat)*	Y		
764.	43368	*Rhinonicteris aurantia (Orange Leaf-nosed bat)*		P4	
765.	24115	*Sminthopsis longicaudata (Long-tailed Dunnart)*		P4	
766.	24116	*Sminthopsis macroura (Stripe-faced Dunnart)*			
767.	24175	*Taphozous georgianus (Common Sheath-tailed Bat)*			
768.	30954	*Tursiops aduncus (Indo-Pacific Bottlenose Dolphin)*			
769.	24205	*Vespadelus finlaysoni (Finlayson's Cave Bat)*			
770.	24040	*Vulpes vulpes (Red Fox)*	Y		
771.	24249	*Zyzomys pedunculatus (Central Rock-rat, Antina)*		T	
Reptile					
772.	25332	*Acanthophis wellsi (Pilbara Death Adder)*			
773.	25350	*Aipysurus apraefrontalis (Short-nosed Seasnake)*		T	
774.	25351	*Aipysurus duboisii (Dubois' Seasnake)*			
775.	25355	*Aipysurus laevis (Olive Seasnake)*			
776.	30831	*Amphibolurus gilberti (Ta-ta, Gilbert's Dragon)*			
777.	30833	*Amphibolurus longirostris (Long-nosed Dragon)*			
778.	44647	*Anilios splendidus*		P2	Y
779.	25318	*Antaresia perthensis (Pygmy Python)*			
780.	25241	*Antaresia stimsoni subsp. stimsoni (Stimson's Python)*			
781.	24992	*Aprasia rostrata (Ningaloo worm-lizard, Monte Bello Worm-lizard)*		P3	
782.	25320	*Aspidites melanocephalus (Black-headed Python)*			
783.	25331	*Brachyurophis approximans (North-western Shovel-nosed Snake)*			
784.	25335	*Caretta caretta (Loggerhead Turtle)*		T	
785.	25015	*Carlia munda (Shaded-litter Rainbow Skink)*			
786.	25336	*Chelonia mydas (Green Turtle)*		T	
787.	24919	*Crenadactylus ocellatus subsp. horni (Clawless Gecko)*			
788.	25020	*Cryptoblepharus plagiocephalus*			
789.	24868	*Ctenophorus clayi (Collared Dragon)*			
790.	24872	*Ctenophorus femoralis (Dune Dragon)*			
791.	24875	*Ctenophorus isolepis subsp. gularis (Central Military Dragon)*			
792.	24876	*Ctenophorus isolepis subsp. isolepis (Crested Dragon, Military Dragon)*			
793.	24882	*Ctenophorus nuchalis (Central Netted Dragon)*			
794.	30897	*Ctenophorus parviceps (Western Heath Dragon, Northern Heath Dragon)*			
795.	24886	*Ctenophorus reticulatus (Western Netted Dragon)*			
796.	25043	*Ctenotus grandis subsp. titan*			
797.	25044	*Ctenotus hanloni*			
798.	25046	*Ctenotus iapetus*			
799.	25048	*Ctenotus inornatus*			
800.	25463	*Ctenotus pantherinus (Leopard Ctenotus)*			
801.	25064	*Ctenotus pantherinus subsp. ocellifer (Leopard Ctenotus)*			
802.	25069	*Ctenotus rufescens*			
803.	25073	*Ctenotus saxatilis (Rock Ctenotus)*			
804.	25090	*Cyclodomorphus melanops subsp. melanops (Slender Blue-tongue)*			
805.		*Cyclodomorphus sp.*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
806.	24995	*Delma australis*			
807.	25001	*Delma nasuta*			
808.	30829	*Delma tealei*			
809.	25004	*Delma tincta*			
810.	25292	*Demansia calodera (Black-necked Whipsnake)*			
811.	25295	*Demansia psammophis subsp. cupreiceps (Yellow-faced Whipsnake)*			
812.	34146	*Diplodactylus capensis (Cape Range Stone Gecko)*		P2	Y
813.	24926	*Diplodactylus conspicillatus (Fat-tailed Gecko)*			
814.	24938	*Diplodactylus ornatus*			
815.	42400	*Diporiphora adductus (Carnarvon Dragon)*			
816.	25362	*Ephalophis greyae*			
817.	43381	*Eremiascincus pallidus (Western Narrow-banded Skink, Narrow-banded Sand Swimmer)*			
818.	25109	*Eremiascincus richardsonii (Broad-banded Sand Swimmer)*			
819.	25301	*Furina ornata (Moon Snake)*			
820.	24952	*Gehyra australis*			
821.	24956	*Gehyra pilbara*			
822.	24959	*Gehyra variegata*			
823.	25232	*Hemidactylus frenatus (Asian House Gecko)*	Y		
824.	24961	*Heteronotia binoei (Bynoe's Gecko)*			
825.	44656	*Hydrophis major (Olive-headed seasnake, greater seasnake)*			
826.	42410	*Hydrophis ornatus (Ornate Reef Seasnake, Sea Snake)*			
827.	43385	*Hydrophis stokesii (Stoke's Seasnake, Sea Snake)*			
828.	25120	*Lerista allochira (Cape Range Slider)*		P3	
829.	25125	*Lerista bipes*			
830.	30928	*Lerista clara*			
831.	25133	*Lerista elegans*			
832.	25148	*Lerista lineopunctulata*			
833.	25482	*Lerista macropisthopus*			
834.	25151	*Lerista macropisthopus subsp. fusciceps*			
835.	25163	*Lerista planiventralis subsp. planiventralis*			
836.	25005	*Lialis burtonis*			
837.	30933	*Lucasium stenodactylum*			
838.	25184	*Menetia greyii*			
839.	25491	*Menetia surda*			
840.	24904	*Moloch horridus (Thorny Devil)*			
841.	25191	*Morethia lineoocellata*			
842.	25193	*Morethia ruficauda subsp. exquisita*			
843.	25497	*Nephrurus levis*			
844.	24968	*Nephrurus levis subsp. occidentalis*			
845.	25197	*Notoscincus ornatus subsp. ornatus*			
846.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
847.	25261	*Pseudechis australis (Mulga Snake)*			
848.	42416	*Pseudonaja mengdeni (Western Brown Snake)*			
849.	25263	*Pseudonaja modesta (Ringed Brown Snake)*			
850.	25009	*Pygopus nigriceps*			
851.	25266	*Simoselaps bertholdi (Jan's Banded Snake)*			
852.	25267	*Simoselaps littoralis (West Coast Banded Snake)*			
853.	24924	*Strophurus ciliaris subsp. aberrans*			
854.	24927	*Strophurus elderi*			
855.	24932	*Strophurus jeanae*			
856.	24941	*Strophurus rankini*			
857.	24946	*Strophurus strophurus*			
858.	25269	*Suta fasciata (Rosen's Snake)*			
859.	25202	*Tiliqua multifasciata (Central Blue-tongue)*			
860.	25207	*Tiliqua rugosa subsp. rugosa*			
861.	25209	*Varanus acanthurus (Spiny-tailed Monitor)*			
862.	25210	*Varanus brevicauda (Short-tailed Pygmy Monitor)*			
863.	25212	*Varanus eremius (Pygmy Desert Monitor)*			
864.	25216	*Varanus giganteus (Perentie)*			
865.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
866.	25526	*Varanus tristis (Racehorse Monitor)*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Appendix D – Likelihood of occurrence assessments

Flora likelihood of occurrence guidelines

Flora likelihood of occurrence assessment

Fauna likelihood of occurrence guidelines

Fauna likelihood of occurrence assessment

Flora likelihood of occurrence assessment guidelines

Likelihood of occurrence	Guideline
Known	Species recorded within survey area from field survey results.
Likely	Species previously recorded within 20 km and large areas of suitable habitat occur in the project footprint.
Possible	Species previously recorded within 20 km and areas of suitable habitat occur/may occur in the project footprint.
Unlikely	Species previously recorded within 20 km, but suitable habitat does not occur in the project footprint.
Highly unlikely	Species not previously recorded within 20 km, suitable habitat does not occur in the project footprint and/or the project footprint is outside the natural distribution of the species.
Other considerations	Intensity of survey, availability of access, growth form type, recorded flowering times, cryptic nature of species

Source information - desktop searches

PMST – DEE Protected Matters Search Tool (PMST) to identify flora listed under the EPBC Act potentially occurring within the study area

TPFL and WAHERB – records of threatened flora from TPFL and WAHERB database searches within the study area

NM – DBCA *NatureMap* (accessed November 2017)

Flora likelihood of occurrence assessment

Family	Taxon	Status		Description (if available) (WA Herbarium 2017, DEE 2017)	Likelihood of occurrence	Source
		EPBC Act	WC Act /DBCA			
Acanthaceae	*Harnieria kempeana* subsp. *rhadinophylla*		P2	Erect or sprawling, spreading, straggly shrub, to 1 m high. Fl. pink/red-purple, May to Sep. Calcareous loam. Amongst limestone rocks, creek banks.	**Likely** – the species has been recorded within 20 km of the project footprint and suitable habitat is likely to occur.	NM, WAHERB
Apocynaceae	*Gymnanthera cunninghamii*		P3	Erect shrub, 1-2 m high. Fl. cream-yellow-green, Jan to Dec. Sandy soils.	**Possible** – the species has been recorded within 20 km of the project footprint and some suitable habitat occurs.	NM
Asparagaceae	*Acanthocarpus rupestris*		P2	Rhizomatous, tufted perennial, herb, to 0.5 m high. Fl. white, May to Jun. Red sand, limestone.	**Likely** – the species has been recorded within 20 km of the project footprint and suitable habitat is likely to occur.	NM, TPFL

Family	Taxon	Status		Description (if available) (WA Herbarium 2017, DEE 2017)	Likelihood of occurrence	Source
		EPBC Act	WC Act /DBCA			
Celastraceae	*Stackhousia umbellata*		P3	Spreading perennial, herb, to 0.7 m high. Fl. yellow, May to Aug. Sandy soils on limestone.	**Likely** – the species has been recorded within 20 km of the project footprint and suitable habitat is likely to occur.	NM, WAHERB
Fabaceae	*Acacia alexandri*		P3	Open or moderately dense, sometimes wispy shrub, 1.5-3 m high. Fl. cream, Jun or Aug to Sep. Limestone. Stony creeks, steep rocky slopes	**Likely** – the species has been recorded within 20 km of the project footprint and suitable habitat is likely to occur. The species has been previously recorded adjacent to the project footprint (Woodman 2013).	NM, WAHERB, TPFL
Fabaceae	*Acacia ryaniana*		P2	Prostrate, straggly or domed, spinescent shrub, 0.1-0.4 m high. Fl. yellow, Jun to Nov. White or red sand. Coastal sand dunes.	**Possible** – the species has been recorded within 20 km of the project footprint and some suitable habitat occurs.	NM
Fabaceae	*Acacia startii*		P3	Dense, rounded, much-branched shrub, 1-2 m high, to 3 m wide. Fl. green-yellow, Jul to Aug. Calcareous loam with limestone pebbles. Stony hills & watercourses.	**Possible** – the species has been recorded within 20 km of the project footprint and some suitable habitat occurs.	NM
Fabaceae	*Daviesia pleurophylla*		P2	Divaricately branched shrub, ca 0.7 m high. Sand dunes.	**Possible** – the species has been recorded within 20 km of the project footprint and some suitable habitat occurs.	NM, WAHERB, TPFL
Fabaceae	*Tephrosia* sp. North West Cape (G. Marsh 81)		P2	-	**Possible** – the species has been recorded within 20 km of the project footprint and some suitable habitat occurs.	NM
Malvaceae	*Brachychiton obtusilobus*		P4	Tree, 3.5-6 m high. Fl. cream, Aug to Sep. Skeletal soils. Rocky limestone ranges, gorges, occasionally sandplains.	**Possible** – the species has been recorded within 20 km of the project footprint and some suitable habitat occurs.	NM, WAHERB
Malvaceae	*Corchorus congener*		P3	Spreading shrub, to 0.6 m high. Fl. yellow, Apr to Jun or Aug to Nov. Sand, red sandy loam with limestone. Sand dunes, plains.	**Likely** – the species has been recorded within 20 km of the project footprint and suitable habitat is likely to occur.	NM, WAHERB, TPFL

Family	Taxon	Status		Description (if available) (WA Herbarium 2017, DEE 2017)	Likelihood of occurrence	Source
		EPBC Act	WC Act /DBCA			
Menispermaceae	*Tinospora esiangkara*		P2	Climber, to 2 m high, large stems with brown, flaky bark. Fl. green, Jul. Pebbly orange-brown calcareous loam. Limestone outcrops or ridges, near creek bank.	**Likely** – the species has been recorded within 20 km of the project footprint and suitable habitat is likely to occur. The species has been previously recorded adjacent to the project footprint (Woodmand 2013).	NM, WAHERB, TPFL
Myrtaceae	*Verticordia serotina*		P2	Shrub, 0.5-1.5 m high. Fl. pink, Aug to Sep. Red sand. Sand dunes.	**Possible** – the species has been recorded within 20 km of the project footprint and some suitable habitat occurs.	NM
Ophioglossaceae	*Helminthostachys zeylanica*		P3	Rhizomatous, perennial, herb or (fern), 0.4-0.6 m high, sterile frond palmately divided; fertile blade spike-like; vernation not circinnate. Fl. May. Black peat. Shady sites in gallery forest, margins of creeks.	**Unlikely** – the species has been recorded within 20 km of the project footprint, but suitable habitat is unlikely to occur.	NM
Phyllanthaceae	*Phyllanthus fuernrohrii*		P3	-	**Possible** – the species has been recorded within 20 km of the project footprint and some suitable habitat occurs.	NM
Proteaceae	*Grevillea calcicola*		P3	Small straggly tree or shrub (several-stemmed), to 4 m high. Fl. cream-white, May or Jul to Aug. Limestone hilltops.	**Likely** – the species has been recorded within 20 km of the project footprint and suitable habitat is likely to occur. The species has been previously recorded adjacent to the project footprint.	NM, WAHERB, TPFL
Scrophulariaceae	*Eremophila forrestii* subsp. *capensis*		P3	Sparsely to much-branched shrub, to 1.4 m high. Brown rocky soils, limestone. Ridges.	**Possible** – the species has been recorded within 20 km of the project footprint and some suitable habitat occurs.	NM, WAHERB
Scrophulariaceae	*Eremophila occidens*		P2	Shrub, to 1.5 m high. Fl. purple-violet, Aug to Sep. Orange/brown sand. Limestone ranges, dunes.	**Possible** – the species has been recorded within 20 km of the project footprint and some suitable habitat occurs.	NM, TPFL

Family	Taxon	Status		Description (if available) (WA Herbarium 2017, DEE 2017)	Likelihood of occurrence	Source
		EPBC Act	WC Act /DBCA			
Scrophulariaceae	*Eremophila youngii* subsp. *lepidota*		P4	Dense, spreading shrub, (0.2-)1-3 m high. Fl. purple-red-pink, Jan or Mar or Jun or Aug to Sep. Stony red sandy loam. Flats plains, floodplains, sometimes semi-saline, clay flats.	**Possible** – the species has been recorded within 20 km of the project footprint and some suitable habitat occurs.	NM, WAHERB

Fauna likelihood of occurrence assessment guidelines

Assessment outcome	Description
Present	Species recorded during the field survey or from recent, reliable records from within or close proximity to the survey area.
Likely	Species are **likely** to occur in the survey area where there is suitable habitat within the survey area and there are recent records of occurrence of the species in close proximity to the survey area. OR Species known distribution overlaps with the survey area and there is suitable habitat within the survey area.
Unlikely	Species assessed as **unlikely** include those species previously recorded within 20 km of the survey area however: • There is limited (i.e. the type, quality and quantity of the habitat is generally poor or restricted) habitat in the survey area. • The suitable habitat within the survey area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the survey area. OR Those species that have a known distribution overlapping with the survey area however: • There is limited habitat in the survey area (i.e. the type, quality and quantity of the habitat is generally poor or restricted). • The suitable habitat within the survey area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the survey area.
Highly unlikely	Species that are considered **highly unlikely** to occur in the survey area include: • Those species that have no suitable habitat within the survey area. • Those species that have become locally extinct, or are not known to have ever been present in the region of the survey area.

Source information - desktop searches

NM – DBCA *NatureMap* (accessed October 2017)

DBCA – SWA – DBCA (2007–) records of threatened fauna, database search within the SWA study area (accessed October 2017)

PMST – DEE Protected Matters Search Tool (PMST) to identify fauna listed under the EPBC Act potentially occurring within the study area (accessed October 2017)

Fauna likelihood of occurrence assessment

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
Actitis hypoleucos	Common Sandpiper	IA	IA	X	X	The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The Common Sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow, and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags (DotE 2017)	**Unlikely** Species known from the region but no suitable habitat present.
Ardea modesta	Great Egret	IA		X		The Great Egret has been reported in a wide range of wetland habitats (for example inland and coastal, freshwater and saline, permanent and ephemeral, open and vegetated, large and small, natural and artificial). These include swamps and marshes; margins of rivers and lakes; damp or flooded grasslands, pastures or agricultural lands; reservoirs; sewage treatment ponds; drainage channels; salt pans and salt lakes; salt marshes; estuarine mudflats, tidal streams; mangrove swamps; coastal lagoons; and offshore reefs. The Eastern Great Egret may retreat to permanent wetlands or coastal areas when other wetlands are dry (for example, during drought). This may occur annually in some regions with regular wet and dry seasons or erratically where the availability of wetland habitat is also erratic (Marchant & Higgins 1990).	**Unlikely** Species known from the region but no suitable habitat present

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
Arenaria interpres	Ruddy Turnstone	IA	IA	X		In Australasia, the Ruddy Turnstone is mainly found on coastal regions with exposed rock coast lines or coral reefs. It also lives near platforms and shelves, often with shallow tidal pools and rocky, shingle or gravel beaches. It can, however, be found on sand, coral or shell beaches, shoals, cays and dry ridges of sand or coral. It has occasionally been sighted in estuaries, harbours, bays and coastal lagoons, among low saltmarsh or on exposed beds of seagrass, around sewage ponds and on mudflats. In north Australia it is known to occur in a wide variety of habitats, and may prefer wide mudflats.	**Unlikely** Species known from the region but no suitable habitat present.
Apus pacificus	Fork-tailed Swift	IA	IA		X	In south-west WA there are sparsely scattered records along the south coast, ranging from the Eyre Bird Observatory and west to Denmark. They are widespread in coastal and sub-coastal areas between Augusta and Carnarvon, including some on nearshore and offshore islands. This species is almost exclusively aerial, flying less than 1 m to at least 300 m above ground. This species is considered rare in the south-west region (DotE 2017).	**Likely** Species known from the region, suitable habitat present.
Calidris acuminata	Sharp-tailed Sandpiper	IA	IA	X	X	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry (DotE 2017).	**Unlikely** Species known from the region but no suitable habitat present.
Calidris alba	Sanderling	IA	IA	X		In Australia, the species is almost always found on the coast, mostly on open sandy beaches exposed to open sea-swell, and also on exposed sandbars and spits, and shingle banks, where they forage in the wave-wash zone and amongst rotting seaweed. Sanderlings also occur on beaches that may contain wave-washed rocky outcrops. Less often the species occurs on more sheltered sandy shorelines of estuaries, inlets and harbours (DotE 2017)	**Highly unlikely** Species known from the region but no suitable habitat present.

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
Calidris canutus	Red Knot	IA	En, IA		X	In Australasia the Red Knot mainly inhabit intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs. They are occasionally seen on terrestrial saline wetlands near the coast, such as lakes, lagoons, pools and pans, and recorded on sewage ponds and saltworks, but rarely use freshwater swamps. They rarely use inland lakes or swamps (DotE 2017).	**Unlikely** Species known from the region but no suitable habitat present.
Calidris ferruginea	Curlew Sandpiper	VU, IA	Cr, IA	X	X	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. They forage at the edges of shallow pools and drains of intertidal mudflats and sandy shores. At high tide, they forage among low sparse emergent vegetation, such as saltmarsh, and sometimes forage in flooded paddocks or inundated saltflats (DotE 2017).	**Unlikely** Species known from the region but no suitable habitat present.
Calidris melanotos	Pectoral Sandpiper	IA	IA		X	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands (DotE 2017)	**Highly unlikely** Species not known from the region.

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
Calidris ruficollis	Red-necked Stint	IA	IA	X		In Australasia, the Red-necked Stint is mostly found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores. Occasionally they have been recorded on exposed or ocean beaches, and sometimes on stony or rocky shores, reefs or shoals. They also occur in saltworks and sewage farms; saltmarsh; ephemeral or permanent shallow wetlands near the coast or inland, including lagoons, lakes, swamps, riverbanks, waterholes, bore drains, dams, soaks and pools in saltflats. They sometimes use flooded paddocks or damp grasslands. They have occasionally been recorded on dry gibber plains, with little or no perennial vegetation (Higgins & Davies 1996).	**Unlikely** Species known from the region but no suitable habitat present.
Calidris subminuta	Long-toed Stint	IA	IA	X		In Australia, the Long-toed Stint occurs in a variety of terrestrial wetlands. They prefer shallow freshwater or brackish wetlands including lakes, swamps, river floodplains, streams, lagoons and sewage ponds. The species is also fond of areas of muddy shoreline, growths of short grass, weeds, sedges, low or floating aquatic vegetation, reeds, rushes and occasionally stunted samphire. It has also been observed at open, less vegetated shores of larger lakes and ponds and is common on muddy fringes of drying ephemeral lakes and swamps. The Long-toed Stint also frequents permanent wetlands such as reservoirs and artificial lakes (DotE 2017).	**Unlikely** Species known from the region but no suitable habitat present.
Charadrius leschenaultia	Greater Sand Plover	IA	IA	X		In the non-breeding grounds in Australasia, the species is almost entirely coastal, inhabiting littoral and estuarine habitats. They mainly occur on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons and inshore reefs, rock platforms, small rocky islands or sand cays on coral reefs. They are occasionally recorded on near-coastal saltworks and saltlakes, including marginal saltmarsh, and on brackish swamps (Stewart *et al*. 2007).	**Unlikely** Species known from the region but no suitable habitat present.

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
Charadrius mongolus	Lesser Sand Plover	EN, IA	EN, IA	X		In non-breeding grounds in Australia, this species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sandflats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wave-cut rock platforms and rocky outcrops. In north-western Australia, the species appears to use the Port Hedland saltworks in preference to nearby beaches. The species is seldom recorded away from the coast, at margins of lakes, soaks and swamps associated with artesian bores (Marchant & Higgins 1993).	**Unlikely** Species known from the region but no suitable habitat present.
Charadrius veredus	Oriental Plover	IA	IA		X	Immediately after arriving in non-breeding grounds in northern Australia, Oriental Plovers spend a few weeks in coastal habitats such as estuarine mudflats and sandbanks, on sandy or rocky ocean beaches or nearby reefs, or in near-coastal grasslands, before dispersing further inland. Thereafter they usually inhabit flat, open, semi-arid or arid grasslands, where the grass is short and sparse, and interspersed with hard, bare ground, such as claypans, dry paddocks, playing fields, lawns and cattle camps or open areas that have been recently burnt (Storr 1980).	**Likely** Species known from the region, potentially suitable habitat present.
Chlidonias leucopterus	White-winged Black Tern	IA	IA	X		The White-winged Black Tern is a non-breeding migrant to Australia. The species is widespread and common along south-western, northern and central-eastern coasts, with only scattered records of small numbers along the coasts elsewhere in southern Australia (Barrett et al. 2003; Blakers et al. 1984; Chatto 2006; Higgins & Davies 1996; Johnstone & Storr 1998). In Western Australia, the species is widespread on the southern west coast to the coasts of the Pilbara region and Kimberley. Few records are from inland regions, mainly along major river systems, such as the Ord drainage.	**Unlikely** Species known from the region but no suitable habitat present. Opportunistic use.

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
Gelochelidon nilotica	Gull-billed Tern	IA	IA	X		The Gull-billed Tern is nomadic or migratory species in Australia. Gull-billed Terns are found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands, where resources are favourable (Morcombe 2004). They are only rarely found over the ocean. The Gull-billed Tern, although essentially an inland species, outside breeding season it shows a distinct preference for saltmarshes and lagoons near the coast. Movements are not fully understood but it is common and widespread in Australia (Morcombe 2004).	**Unlikely** Species known from the region but no suitable habitat present. Opportunistic use
Glareola maldivarum	Oriental Pratincole	IA	IA	X	X	In non-breeding grounds in Australia, the Oriental Pratincole usually inhabits open plains, floodplains or short grassland (including farmland or airstrips), often with extensive bare areas. They often occur near terrestrial wetlands, such as billabongs, lakes or creeks, and artificial wetlands such as reservoirs, saltworks and sewage farms, especially around the margins. The species also occurs along the coast, inhabiting beaches, mudflats and islands, or around coastal lagoons (Lloyd and Lloyd 1991).	**Highly unlikely** Species not known from the region. Migrant, irregular visitor
Hirundo rustica	Barn Swallow	IA	IA		X	In Australia, the Barn Swallow is recorded in open country in coastal lowlands, often near water, towns and cities. Birds are often sighted perched on overhead wires, and also in or over freshwater wetlands, paperbark Melaleuca woodland, mesophyll shrub thickets and tussock grassland (Schodde & Mason 1999).	**Likely** Species known from the region
Limosa lapponica subsp. baueri	Bar-tailed Godwit	IA	Vu, IA	X	X	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland wetlands or in	**Unlikely** Species known from the region but no suitable habitat present.

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
						areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas (Marchant & Higgins 1993).	
Limosa limosa	Black-tailed Godwit	IA	IA	Z		In Australia the Black-tailed Godwit has a primarily coastal habitat environment. The species is commonly found in sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats, or spits and banks of mud, sand or shell-grit; occasionally recorded on rocky coasts or coral islets. The use of habitat often depends on the stage of the tide. It is also found in shallow and sparsely vegetated, near-coastal, wetlands; such as saltmarsh, saltflats, river pools, swamps, lagoons and floodplains. There are a few inland records, around shallow, freshwater and saline lakes, swamps, dams and bore-overflows. They also use lagoons in sewage farms and saltworks (Higgins & Davies 1996).	**Unlikely** Species known from the region but no suitable habitat present.
Limosa lapponica subsp. menzbieri	Northern Siberian Bar-tailed Godwit	VU, IA	Cr, IA		X	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh (Morcombe 2004). They usually forage near the edge of water or in shallow water, mainly in tidal estuaries and harbours and roost on sandy beaches, sandbars, spits and also in near-coastal saltmarshs (Marchant & Higgins 1993).	**Unlikely** Species known from the region but no suitable habitat present.
Merops ornatus	Rainbow Bee-eater	IA		X		Open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. It also inhabits sand dune systems in coastal areas and at inland sites that are in close proximity to water (Morcombe 2004).	**Likely** Suitable habitat, species known from the region.

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
Motacilla cinerea	Grey Wagtail	IA	IA		X	One of the five non-breeding extremely uncommon migrants (Barn and Red-rumped Swallows, Grey and Yellow Wagtails, Oriental Reed-Warbler) to Australia. Non-breeding habitat only has a strong association with water, particularly rocky substrates along water courses but also lakes and marshes (DotE 2016). Rare visitor to WA. Mainly banks and rocks in fast-running freshwater habitats: rivers, creeks, streams, and around waterfalls, both in forest and open country; but occurs almost anywhere during migration (Johnstone and Storr 2004).	**Unlikely** Migrant, irregular visitor. No breeding habitat. Limited foraging and refuge habitat (during migration period) within survey area.
Motacilla flava	Yellow Wagtail	IA	IA		X	One of the five non-breeding extremely uncommon migrants (Barn and Red-rumped Swallows, Grey and Yellow Wagtails, Oriental Reed-Warbler) to Australia. Non-breeding habitat only: mostly well-watered open grasslands and the fringes of wetlands. Roosts in mangroves and other dense vegetation (DotE 2016).	**Unlikely** Migrant, irregular visitor. No breeding habitat. Limited foraging and refuge habitat (during migration period) within survey area.
Numenius madagascariensis	Eastern Curlew	T	Cr, IA	X	X	The Eastern Curlew is a large non-breeding migratory shorebird, found commonly along the north coast of Western Australia, but rarely south of Shark Bay. The species is found along the coastline from Barrow Island and Dampier Archipelago, through the Kimberley in WA to the NT. It is found in estuaries, bays, harbours, inlets and coastal lagoons, saltworks and sewerage farms, areas (e.g. intertidal mudflats or sandflats fringed by mangroves) often with beds of seagrass and occasionally on ocean beaches, coral reefs, rock platforms and rocky islets. The Eastern Curlew forages on soft, sheltered, intertidal sand- or mudflats, often near mangroves, on saltflats, saltmarshes, rockpools, coastal reefs and ocean beaches near the tideline. The species roosts in large flocks, separate from other waders on sandy spits and islets, dry beach sand near the high-water mark, among coastal vegetation (including low saltmarsh and mangroves) and occasionally on reef-flats, in the shallow water of lagoons, near-coastal wetlands, in trees and posts (Morcombe 2004).	**Unlikely** Species known from the region but no suitable habitat present.

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
Numenius minutus	Little Curlew	IA	IA	X		When resting during the heat of day, the Little Curlew congregates around pools, river beds and water-filled tidal channels, and shallow water at edges of billabongs. The species prefers pools with bare dry mud (including mudbanks in shallow water) and they do not use pools if they are totally dry, flooded or heavily vegetated (Higgins & Davies 1996). Birds may also rest in grassy, open woodlands and on bare blacksoil plains, or on dry or recently burnt grasslands on floodplains, which may be without vegetation for hundreds of metres, and occasionally on mudflats when nearby grasslands are unburnt, or around swamps. Resting has also been recorded under partly submerged vegetation. After freshwater pools dry up, roosting may occur in the shallows of reservoirs and the sea (Higgins & Davies 1996).	**Unlikely** Species known from the region but no suitable habitat present.
Numenius phaeopus	Whimbrel	IA	IA	X		The Whimbrel is often found on the intertidal mudflats of sheltered coasts. It is also found in harbours, lagoons, estuaries and river deltas, often those with mangroves, but also open, unvegetated mudflats. It is occasionally found on sandy or rocky beaches, on coral or rocky islets, or on intertidal reefs and platforms. It has been infrequently recorded using saline or brackish lakes near coastal areas. It also used saltflats with saltmarsh, or saline grasslands with standing water left after high spring-tides, and in similar habitats in sewage farms and saltfields (Higgins & Davies 1996). There are a small number of inland records from saline lakes and canegrass swamps (Jarman 1978). It has also been recorded in coastal dunes and on a football field (Smith & Chafer 1987).	**Unlikely** Species known from the region but no suitable habitat present.

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
Pandion haliaetus	Osprey	IA	IA		X	Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia. They require extensive areas of open fresh, brackish or saline water for foraging (Marchant & Higgins 1993). They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes. They exhibit a preference for coastal cliffs and elevated islands in some parts of their range, but may also occur on low sandy, muddy or rocky shores and over coral cays.	**Unlikely** Species known from the region but no suitable habitat present.
Pezoporus occidentalis	Night Parrot	Cr	En		X	The Night Parrot inhabits arid and semi-arid areas that are characterised by having dense, low vegetation. Based on accepted records, the habitat of the Night Parrot consists of Triodia grasslands in stony or sandy environments and of samphire and chenopod shrublands, including genera such as Atriplex, Bassia and Maireana, on floodplains and claypans, and on the margins of saltlakes, creeks or other sources of water (Parker, 1980). It has also been observed to enter dense Muehlenbecki growth when flushed from a more typical habitat (Boles et al. 1994).	**Unlikely** Potentially suitable habitat within the survey area. Given the lack of recent and historic records within or nearby the survey area, it is considered unlikely that this species would occur within the survey area.
Pluvialis fulva	Pacific Golden Plover	IA		X		In non-breeding grounds in Australia this species usually inhabits coastal habitats, though it occasionally occurs around inland wetlands. Pacific Golden Plovers usually occur on beaches, mudflats and sandflats (sometimes in vegetation such as mangroves, low saltmarsh such as *Sarcocornia*, or beds of seagrass) in sheltered areas including harbours, estuaries and lagoons, and also in evaporation ponds in saltworks. The species is also sometimes recorded on islands, sand and coral cays and exposed reefs and rocks. They are less often recorded in terrestrial habitats, usually wetlands such as fresh, brackish or saline lakes, billabongs, pools, swamps and wet claypans, especially those with muddy margins and often with submerged vegetation or short emergent grass. Other terrestrial habitats inhabited include short (or,	**Unlikely** Species known from the region but no suitable habitat present.

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
						occasionally, long) grass in paddocks, crops or airstrips, or ploughed or recently burnt areas, and they are very occasionally recorded well away from water (Marchant & Higgins 1993). On its breeding grounds it occurs in tundra (Dement'ev & Gladkov 1951). Feeding habitat: This species usually forages on sandy or muddy shores (including mudflats and sandflats) or margins of sheltered areas such as estuaries and lagoons, though it also feeds on rocky shores, islands or reefs. In addition, Pacific Golden Plovers occasionally forage among vegetation, such as saltmarsh, mangroves or in pasture or crops (Bransbury 1985; Evans 1975; Ewart 1973; Pegler 1983; Smith 1966; Thomas 1968). Roosting habitat: They usually roost near foraging areas, on sandy beaches and spits or rocky points, islets or exposed reefs, occasionally among or beneath vegetation including mangroves or low saltmarsh, or among beachcast seaweed. They sometimes also roost on levee banks and islands in evaporation ponds in saltworks (Bransbury 1985; Ewart 1973; Smith 1966; Thomas 1968; Patterson 1982; Pegler 1983; Prendergast et al. 1985). Breeding habitat: Breeding occurs in dry areas of tundra away from the coast, including upland and montane tundra, usually on slopes of low hills, knolls or foothills vegetated with lichen and moss, or in bare, stony areas. Some sites are near vegetated areas with shrubs, and although usually above the treeline, they very occasionally breed in forest tundra (Cramp & Simmons 1983; Dement'ev & Gladkov 1951; Wiersma 1996). After the young hatch, they move to moister habitats, such as Sphagnum swamps (Cramp & Simmons 1983). The species does not rely on a listed threatened ecological community.	

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
Pluvialis squatarola	Grey Plover	IA		X		In non-breeding grounds in Australia, Grey Plovers occur almost entirely in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons. They also occur around terrestrial wetlands such as near-coastal lakes and swamps, or salt-lakes. The species is also very occasionally recorded further inland, where they occur around wetlands or salt-lakes (Marchant & Higgins 1993).	**Unlikely** Species known from the region but no suitable habitat present.
Sterna dougallii	Roseate Tern	IA	IA	X		The habitat of the Roseate tern is essentially marine/coastal in tropical and subtropical regions. Often found around coral reefs, foraging over reef, reef lagoons and surrounding sea. Usually keeps away from the mainland shoreline, but will use shallow waters just a hundred or so meters offshore. Will also use sand cays, beaches, tidal inlets and islands, particularly those of the Abrolhos Group for breeding (Morcombe 2004, Pizzey and Knight 2012).	**Unlikely** Species known from the region but no suitable habitat present.
Sternula nereis subsp. Nereis	Australian Fairy Tern	VU	Vu		X	The habitat of the fairy tern is essentially marine, including sheltered coasts, bays, inlets, estuaries, coastal lagoons, ocean beaches but rarely out to sea or out of sight of land. They also inhabit wetlands near the coast including salt ponds and lakes. This species favours sites with sand spits and small sand islets in river mouth channels (Morcombe 2004).	**Unlikely** Species known from the region but no suitable habitat present.
Tringa brevipes	Grey-tailed Tattler	IA	IA	X		The Grey-tailed Tattler is often found on sheltered coasts with reefs and rock platforms or with intertidal mudflats. It can also be found at intertidal rocky, coral or stony reefs as well as platforms and islets that are exposed at low tide. It has been found around shores of rock, shingle, gravel or shells and also on intertidal mudflats in embayments, estuaries and coastal lagoons, especially fringed with mangroves. In Moreton Bay, Queensland, it is most abundant in areas with dense beds of seagrass. In Tasmania it is also abundant in areas with seagrass beds. It is less often on open flat sandy beaches or sandbanks, especially around accumulated seaweed or isolated clumps of dead coral. It is occasionally found around	**Unlikely** Species known from the region but no suitable habitat present.

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
						near-coastal wetlands, such as lagoons and lakes and ponds in sewage farms and saltworks. Inland records for the species are rare with sightings on river banks and the edges of rock pools (Higgins & Davies 1996).	
Tringa glareola	Wood Sandpiper	IA	IA	X		The Wood Sandpiper uses well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes. They are typically associated with emergent, aquatic plants or grass, and dominated by taller fringing vegetation, such as dense stands of rushes or reeds, shrubs, or dead or live trees, especially Melaleuca and River Red Gums (*Eucalyptus camaldulensis*) and often with fallen timber. They also frequent inundated grasslands, short herbage or wooded floodplains, where floodwaters are temporary or receding, and irrigated crops. They are also found at some small wetlands only when they are drying. They are rarely found using brackish wetlands, or dry stunted saltmarsh. Typically they do not use coastal flats, but are occasionally recorded in stony wetlands. This species uses artificial wetlands, including open sewage ponds, reservoirs, large farm dams, and bore drains (Higgins & Davies 1996). In Western Australia, within wetlands, birds often occur within a few metres of one another and are concentrated at a few sites in a wetland (Higgins & Davies 1996).	**Unlikely** Species known from the region but no suitable habitat present.
Tringa nebularia	Common Greenshank	IA	IA	X	X	The Common Greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. It will also use artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores. The edges of the wetlands used are generally of mud or clay, occasionally of sand, and may be bare or with emergent or fringing vegetation, including	**Unlikely** Species known from the region but no suitable habitat present.

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
						short sedges and saltmarsh, mangroves, thickets of rushes, and dead or live trees. It was once recorded with Black-winged Stilts (*Himantopus himantopus*) in pasture, but are generally not found in dry grassland (Higgins & Davies 1996).	
Tringa stagnatilis	Marsh Sandpiper	IA	IA	X		The Marsh Sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and also regularly at sewage farms and saltworks. They are recorded less often at reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes. In north Australia they prefer intertidal mudflats (Higgins & Davies 1996), although surveys in Kakadu National Park recorded more birds around shallow freshwater lakes than in areas influenced by tide (Bamford 1988). At the Top End they often use ephemeral pools on inundated freshwater and tidal floodplains (Higgins & Davies 1996). Three of the five sites with highest recorded numbers are saltwater habitats (Hunter Estuary, NSW; Port Hedland Saltworks, Western Australia; Tullakool Evaporation Ponds, NSW) (Watkins 1993). In the south-east Gulf of Carpentaria they have been recorded round both saline and fresh waters (Garnett 1989). Elsewhere they said to avoid, or rarely occur in, tidal habitats, and rarely occur on beaches. In Western Australia they prefer freshwater to marine environments. In south-east Australia they prefer inland saline lakes and coastal saltworks. They are found infrequently around mangroves (Higgins & Davies 1996).	**Unlikely** Species known from the region but no suitable habitat present.
Mammals							

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
Dasyurus hallucatus	Northern Quoll	EN	En		X	The Northern Quoll once occurred across the majority of northern Australia but its range has significantly contracted. It occurs in the Pilbara region but in disjunct populations. The Northern Quoll inhabits a range of vegetation associations but is especially abundant on dissected rocky escarpment and eucalypt woodland within 200 km of the coast. It is known to den in rock crevices and rock piles and favours rocky areas. They are predominantly nocturnal but are occasionally active during the day, particularly during the mating season and are known to have a large home range (Van Dyck and Strahan 2008).	**Unlikely** Species not known from the study area, nearest population known from Hamersley Range.
Petrogale lateralis subsp. lateralis	Black-Flanked Rock Wallaby	T	En	X	X	The habitat of Black-flanked Rock-wallaby varies between colonies but always involves grassland feeding habitat for feeding in close proximity to cliff, rock-pile, talus or escarpment refuge habitat. Rock cliffs or other steep substrates with adequate shelter and refuge are essential for breeding. Examples of habitat include limestone outcrops and coastal cliffs on Barrow Island, the gorge of the Murchison River in Kalbarri National Park, granite outcrops in the wheatbelt, and granite outcrops, sandstone cliffs and gabbro rock piles on Depuch Island (Maxwell et al. 1996; Pearson & Kinnear 1997).	**Unlikely** Species known from the region but no suitable habitat present.
Pseudomys chapmani	Western Pebble-mound Mouse	P4		X		The Western Pebble-mound Mouse is restricted to the Pilbara region where it is recognised as an endemic species. Habitat for the Western Pebble-mound Mouse can be found on stony hillsides with hummocky grasslands and little or no soil. It constructs large mounds of pebbles on stony slopes which cover an area of 0.5-9.0 square metres. 'Active' mounds are characterized by volcano-like cones capped by 'craters' that mark occluded entrances to subterranean burrow systems in which the mice live, often gregariously (Van Dyck and Strahan 2008).	**Unlikely** Species not known from the study area, confined to central and eastern Pilbara.

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
Rhinonicteris aurantia	Pilbara Leaf-nosed Bat	P4	Vu	X	X	The Pilbara Leaf-nosed Bat roosts in deep caves or mines in the wet season and forages nearby. This species occurs in the Pilbara region where its populations are scattered and localised. There are a few known populations of this species in the western Pilbara, roosting in caves formed in gorges that dissect massive siliceous sedimentary geology. It is most often observed in flight over waterholes in gorges (Van Dyck and Strahan 2008). Optimal roosts are thought to occur in caves that form between ascending rock layers, where humidity is maintained from seeping groundwater (Van Dyck and Strahan 2008). Roosts are commonly located over pools of water, or areas deep within the mine or cave structure which provides elevated temperature and humidity. Foraging habitat includes: Triodia hummock grasslands covering low rolling hills and shallow gullies, with *Eucalyptus camaldulensis* along the creeks; over small watercourses throughout granite boulder terrain; over pools and low shrubs in ironstone gorges; and in and around gravelly watercourses with *Melaleuca leucadendron*.	**Unlikely** Species known from the region but no suitable habitat present.
Sminthopsis longicaudata	Long-tailed Dunnart	P4		X		The Long-tailed Dunnart occurs throughout the Gibson Desert, Murchison, southern Canarvon Basin and the Pilbara in Western Australia. Its habitat includes rugged, rocky areas with hummock grasses, shrubs and tall open shrublands and woodlands. In the Young Range in the Gibson Desert, the Long-tailed Dunnart has been found to be associated with plateaus, composed of boulders and stones, with some fine red soils, and sparsely vegetated Mulga (*Acacia aneura*) and Minniritchi (*A. grasbyi*) shrubs over spinifex (Van Dyck and Strahan 2008).	**Unlikely** Species not known from the region.
Reptiles							
Aprasia rostrata	Ningaloo worm-lizard	P3		X		The Ningaloo worm-lizard occupies a variety of sandy habitats including white coastal dunes and red dunes vegetated with *Triodia* from North West Cape to Yardie Creek and Learmonth and inland to Bullara Station (Wilson and Swan 2017).	**Likely** Species endemic to the region.

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
Diplodactylus capensis	Cape Range Stone Gecko	P2		X		The Cape Range Stone gecko is restricted to the rocky northern end of North West Cape (Wilson and Swan 2017).	**Likely** Species endemic to the region.
Lerista allochira	Cape Range Slider	P3		X		The Cape Range Slider is restricted to dissected limestone gorges and plateaux on North West Cape (Wilson and Swan 2017).	**Likely** Species endemic to the region.
Fish							
Milyeringa veritas	Blind Gudgeon, Cave Gudgeon	VU	V			Lives beneath coastal limestone in perpetually dark, slightly brackish subterranean water in subterranean waters below the narrow coastal plain between North West Cape and Yardie Creek; Five Mile, Homestead, Kudmurra, Milyering (Mangrove), New Yardie, Pilgramuna and Tantabiddi Wells (Alen *et al*. 2002; Romero and Vanselow 2000).	**Likely** Species endemic to the region.
Ophisternon candidum	Blind Cave Eel	VU	V			The Blind Cave Eel inhabits subterranean caves, fissures and wells of the Cape Range Peninsula and incidentally in Bungaroo Creek (near Pannawonica, 100 km south of Karratha), in north-west WA (Allen 1982; Humphreys 1999; Humphreys & Feinberg 1995; WA OEPA 2012).	**Likely** Species endemic to the region.
Invertebrates							
Bamazomus subsolanus	Eastern Cape Range Bamazomus	EN				Group: Arachnids	**Likely** Species known from the region.
Bamazomus vespertinus	Western Cape Range Bamazomus	EN				Group: Arachnids	**Likely** Species known from the region.
Draculoides bramstokeri	Barrow Island Draculoides	VU				Group: Arachnids Known from Camerons Cave and one other location in Exmouth. Also known from Barrow Island.	**Likely** Species known from the region.

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
Draculoides brooksi	Northern Cape Range Draculoides	EN				Group: Arachnids	**Likely** Species known from the region.
Draculoides julianneae	Western Cape Range Draculoides	EN				Group: Arachnids	**Likely** Species known from the region.
Draculoides vinei	Cape Range Draculoides	P4				Group: Arachnids	**Likely** Species known from the region.
Indohya damocles	Camerons Cave Pseudoscorpion	CR				Group: Arachnids Only known from the dark zone of Camerons Cave	**Likely** Species known from the region.
Nocticola flabella	Cape Range Blind Cockroach	P2				Group: Insects	**Likely** Species known from the region.
Stygiocaris lancifera	Lance-beaked Cave Shrimp	VU				Group: Crustaceans	**Likely** Species known from the region.
Stygiocaris stylifera	Spear-beaked Cave Shrimp	P4				Group: Crustaceans	**Likely** Species known from the region.
Stygiochiropus isolatus	millipede	VU				Group: Millipedes	**Likely** Species known from the region.
Stygiochiropus peculiaris	Camerons Cave Millipede	CR				Group: Millipedes Apparently endemic to Camerons Cave	**Likely** Species known from the region.

Species name	Common name	Status		Search		Description and habitat requirements	Likelihood of occurrence
		State	Federal	NM	PMST		
Stygiochiropus sympatricus	millipede	VU				Group: Millipedes	**Likely** Species known from the region.

References

Allen, G.R. (1982). A Field Guide to Inland Fishes of Western Australia. Perth, Western Australia: University of Western Australia Press.

Allen, G.R., S.H. Midgley and M. Allen, 2002. Field guide to the freshwater fishes of Australia. Western Australian Museum, Perth, Western Australia. 394 p.

Bamford, M.J. (1988). Kakadu National Park: a Preliminary Survey of Migratory Waders, October/November 1987. RAOU Report Series. 41:1-34. Melbourne: Royal Australasian Ornithologists Union.

Barrett, G., A. Silcocks, S. Barry, R. Cunningham and R. Poulter (2003). The New Atlas of Australian Birds. Melbourne, Victoria: Birds Australia.

Blakers M, Davies SJJF, Reilly PN (1984) 'The Atlas of Australian Birds'. Melbourne University Press: Melbourne).

Boles, W.E., N.W. Longmore and M.C. Thompson (1994). A recent specimen of the Night Parrot, *Geopsittacus occidentalis*. Emu. 94:37-40.

Bransbury, J. (1985). Waders of littoral habitats in south-eastern South Australia. South Australian Ornithologist. 29:180-187

Chatto, R 2001, The distribution and status of colonial breeding seabirds in the Northern Territory, Technical report 70, Parks and Wildlife Commission of the Northern Territory, Palmerston.

Cramp, S. & K.E.L. Simmons, eds. (1983). Handbook of the Birds of Europe, the Middle East and North Africa. The Birds of the Western Palearctic. Volume 3, Waders to Gulls. Oxford: Oxford University Press.

Dement'ev, G.P. & N.A. Gladkov (Eds) (1951). Birds of the Soviet Union, Volume 3. Jerusalem: Israel Program for Scientific Translations

Department of the Environment (DotE) (2016), Species Profile and Threats Database, Department of the Environment, Canberra

Department of the Environment (DotE) (2017), Species Profile and Threats Database, Department of the Environment, Canberra

Evans, P.R. (1975). Notes on the feeding of shorebirds on Heron Island. Sunbird. 6:25-30.

Ewart, A. (1973). Bird observations at the Plantation Creek estuary, Ayr, North Queensland. Sunbird. 4:58-61

Garnett, S.T. (1989). Wading Bird Abundance and Distribution - South-eastern Coast of the Gulf of Carpentaria. RAOU Report Series. 58:1-39.

Higgins P.J. and Davies S.J.J.F. (Eds) 1996. Handbook of Australian, New Zealand and Antarctic Birds. Volume 3: Snipe to Pigeons. Oxford University Press, Melbourne.

Humphreys, W.F. & M.N. Feinberg (1995). Food of the blind cave fishes of northwestern Australia. Records of the Western Australian Museum. 17:29-33.

Humphreys, W.F. (1999). The distribution of Australian cave fishes. Records of the Western Australian Museum. 19:469-472.

Jarman, H. (1978). An inland record of the Whimbrel. Australian Bird Watcher. 7:170.

Johnstone, R.E.; and Storr, G.M. (1998).Handbook of Western Australian Birds. Volume I: Non-passerines (Emu to Dollarbird). Perth: Western Australian Museum.

Johnstone, R.E.; and Storr, G.M. (2004).Handbook of Western Australian Birds. Volume II: Passerines (Blue winged Pitta to Gouldian Finch). Perth: Western Australian Museum.

Lloyd, R.L. and H.J. Lloyd (1991). An Oriental Pratincole at the Dry Creek Saltfields. South Australian Ornithologist. 31:74.

Marchant, S. and Higgins, P.J. (1990). Handbook of Australian, New Zealand and Antarctic Birds. Volume One - Ratites to Ducks. Melbourne, Victoria: Oxford University Press.

Marchant, S. and P.J. Higgins, eds. (1993). Handbook of Australian, New Zealand and Antarctic Birds. Volume 2 - Raptors to Lapwings. Melbourne, Victoria: Oxford University Press.

Maxwell, S., A.A. Burbidge and K. Morris (1996). The 1996 Action Plan for Australian Marsupials and Monotremes. [Online]. Wildlife Australia, Environment Australia. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/action/.

Morcombe, M 2004, Field Guide to Australian Birds, Steve Parish Publishing Archer Field Queensland Australia.

Parker, S.A. (1980). Birds and conservation parks in the north-east of South Australia. South Australian Parks and Conservation. 3:11-18.

Patterson, R.M. (1982). A survey of the wader population of Barilla Bay. An Occasional Stint. 1:21-28.

Pearson, D.J. and J.E. Kinnear (1997). A review of the distribution, status and conservation of rock-wallabies in Western Australia. Australian Mammalogy. 19:137-152.

Pegler, J.M. (1983). A brief survey of the water birds in the Shoalhaven-Crookhaven estuary. Australian Birds. 17:38-42.

Pizzey, G. and Knight, F. (2012). The field guide to the birds of Australia. 9th Edition, Sydney Australia, Harper Collins Publishing.

Prendergast, H.D.V., A. Brooks & I.M. Taylor (1985). Summer wader counts on Tryon Island, Capricorn Group. Sunbird. 15:80-83.

Romero, A. and P.B.S. Vanselow, 2000. Threatened fishes of the world: *Milyeringa veritas* Whitley, 1945 (Eleotridae). Environ. Biol. Fish. 57:36.

Schodde, R. and I.J. Mason (1999). The Directory of Australian Birds: Passerines. Melbourne, Victoria: CSIRO

Smith, F.T.H. (1966). Wader records and observations in mid-southern Victoria, 1963-1965. Australian Bird Watcher. 2:246-266.

Smith, L.E. and C.J. Chafer (1987). The avifauna of Bass Point, New South Wales. Australian Birds. 21:1-18.

Stewart, D., A. Rogers and D.I. Rogers (2007). Species description. In: Geering, A., L. Agnew and S. Harding, eds. Shorebirds of Australia. Page(s) 75-196. Melbourne: CSIRO Publishing.

Storr, G.M. (1980). Birds of the Kimberley Division, Western Australia. Special Publications of the Western Australian Museum, No. 11. 11:1-117. Perth, Western Australia: Western Australian Museum.

Thomas, D.G. (1968). Waders of Hobart. Emu. 68:95-125.

Van Dyke S and Strahan R 2008, The Mammals of Australia, Third Edition, New Holland Publishing, Sydney Australia.

Watkins, D. (1993). A national plan for shorebird conservation in Australia. RAOU Report Series. 90.

Wiersma, P. (1996). Charadriidae (Plovers) species accounts. In: del Hoyo, J., A. Elliott & J. Sargatal, eds. Handbook of the Birds of the World. Volume 3. Hoatzin to Auks. Page(s) 411-442. Barcelona: Lynx Editions.

Western Australia Office of the Environmental Protection Authority (WA OEPA) (2012). A review of subterranean fauna assessment in Western Australia. Perth: Environmental Protection Authority.

Wilson, S and Swan, G (2017), A Complete Guide to Reptiles of Australia, 2nd Edition, Sydney Australia, New Holland Press.

GHD

Level 10
999 Hay Street
T: 61 8 6222 8222 F: 61 8 6222 8555 E: permail@ghd.com

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