Biodiversity Survey Report

Junja Solar Farm, Port Hedland

MAY 2021

SW environmental

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SW Environmental engaged Vicki Long & Associates (VLA) (2021) to prepare the flora and vegetation, and Greg Harewood to prepare the fauna components of this report. SW Environmental has relied on the accuracy and information supplied by Vicki Long & Associates and Greg Harewood directly in the preparation of the relevant sections of this report.

- Vicki Long & Associates (VLA) (2021). Pilbara Solar Junja Vegetation and Flora Survey – Town of Port Hedland. Unpublished report prepared for SW Environmental.
- Harewood (2021) Fauna Assessment Junja Solar Area Port Hedland. Unpublished report prepared for SW Environmental.

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Common terms/acronyms

BC Act	WA *Biodiversity Conservation Act 2016*
DAWE	Federal Department of Agriculture, Water and the Environment
DBCA	WA Department of Biodiversity, Conservation and Attractions
DWER	WA Department of Water and Environmental Regulation
EP Act	WA *Environmental Protection Act 1986*
EPBC Act	Federal *Environment Protection and Biodiversity Conservation Act 1999*
Project	The proposed action
Survey area	The Project extent as provided by the client
WA	Western Australia

Executive summary

Pilbara Solar are proposing to develop a 10 MW solar farm, over a 25.7 hectare area of land including an easement, at Jinparinya, Port Hedland. A Biodiversity Survey Report was required in conjunction with other environmental investigations to guide project planning and approvals. This report presents the results of the Biodiversity Survey. The surveys consisted of a basic (reconnaissance) and targeted terrestrial fauna, flora and vegetation surveys.

The flora and vegetation field surveys were conducted by Principal botanist, Vicki Long (Vicki Long and Associates) on 6th October 2020. The vegetation recorded is relatively widespread within the Uaroo Land System, both to the east and west of Port Hedland. Two thirds of the survey area is occupied by low heath of *Acacia stellaticeps*, which inhibits the establishment and growth of other species, resulting in a low species diversity. The second vegetation type is more species diverse and is less well represented in the wider area. Scattered to open *Owenia reticulata* trees over tall and low *Acacia shrubland* is relatively widespread throughout the surrounding area, however, the abundance of *Dolichandrone occidentalis* in the survey area makes it less common.

The survey was undertaken as a dry season survey. Plants were dry, defoliated, dormant or dead. Most annual species were senesced and although some could be identified from persisting material, some were unidentifiable. However, the survey area is small, and it is probable that all component species of the two vegetation types recorded, would be well represented in the relatively widespread vegetation types in the surrounding region.

Three of the four Conservation Significant plant species known to occur within 20 km of the survey area are categorised as P3 annuals, two of which may be present following rainfall. A population of about 50- 100 dead plants of P3 *Heliotropium muticum* were recorded outside of the survey area on a windrow of an existing track. Any impact to conservation significant species if they were to occur within the survey area, would not significantly reduce their known populations

The P1 species, *Tephrosia rosea var Port Hedland* is a perennial species and although the habitat indicates the species is likely to be present, it was not recorded during the survey. It was assessed as having a low likelihood of occurrence following the field visit. Clearing within the surveyed area is unlikely to have a significant impact on conservation significant flora.

Weeds (**Cenchrus ciliaris* and **C. setiger*) were recorded at very low densities (<2%) over the entire survey area.

The fauna field survey was carried out on the 7th September 2020 and 13th May 2021 by Zoologist Greg Harewood. The survey area does not contain wetlands, watercourses, rock outcrops, caves or fallen hollow logs. Leaf litter is generally absent or very sparse and trees contain no hollows. Overall fauna habitat quality was considered to be Poor.

Given the small size of the survey area and the lack of habitat variety, the total fauna assemblage present is likely to be depauperate, and well represented locally with similar fauna habitats extensive in the wider area. Some fauna species, which would not typically reside in the survey area itself, in particular those that occur at low densities but have a large home range, may occasionally be encountered.

Northern Quoll (*Dasyurus hallucatus*) (S2 BC Act, Endangered EPBC Act) scat was found within the survey area. No other evidence of the species was seen. It is considered unlikely that this species permanently

resides within the survey area given there is a total lack of refuge habitat (i.e. caves, rock outcrops, hollow logs/trees or large burrows). No evidence of any other fauna species of conservation significance identified during the literature review was observed.

Additional species of conservation significance may also utilise the survey area, though, as no evidence of their presence was identified during the field survey, their status in the area remains uncertain:

- Barn Swallow *Hirundo rustica* – S5 (BC Act), Migratory (EPBC Act)
- Peregrine Falcon *Falco peregrinus* – S7 (BC Act)
- Grey Falcon *Falco hypoleucos* – S3 (BC Act), Vulnerable (EPBC Act)
- Fork-tailed Swift *Apus pacificus* – S5 (BC Act), Migratory (EPBC Act)
- Bilby *Macrotis lagotis* – S3 (BC Act), Vulnerable (EPBC Act)
- Brush-tailed Mulgara *Dasycercus blythi*. - P4 (DBCA Priority Species)

Potential impacts on these fauna species and fauna in general are likely to be nil to low due to the relatively small area of clearing required and the large expanses of adjoining and nearby similar and in some cases better quality habitat.

Recommendations

- Care should be taken to prevent the spread of the highly invasive, single kapok (**Aerva javanica*) plant recorded in the survey area. This plant and its surrounding soil, should be removed, placed in a plastic bag, sealed and disposed of to prevent the spread of seeds throughout the area.
- Prior to any clearing being undertaken, any young *Owenia reticulata* trees should be removed and transplanted around the Jinparinya Aboriginal Community to increase shade.
- Given the possible presence of some conservation significant ground dwelling fauna it is recommended that immediately prior to any clearing, vegetation to be inspected by a licensed "fauna specialist" (in particular to identify mulgara and bilby burrows) so that the appropriate management measures can be employed.

1 Introduction

1.1 Background

Pilbara Solar proposes to construct a 10 megawatt (MW) alternating current (AC) solar farm approximately 26 km east of Port Hedland, Western Australia (WA) (herein referred to as 'the project'). The project site includes a circa 22.5 ha development area and 4.4 ha easement (Figure 1). A Development Application (DA) has been developed by NGH on behalf of Pilbara Solar in consultation with adjacent landowners, the Town of Port Hedland (ToPH) and Horizon Power.

To support the planning submission, NGH Consulting required a biodiversity survey to be conducted for the project. The Biodiversity Survey Report consists of basic (reconnaissance) and targeted terrestrial fauna, flora and vegetation components.

1.2 Scope of work

1.2.1 The survey area

The circa 25.7 ha survey area is situated approximately 350 m north of the Jinparinya Aboriginal Community (JAC). It is part of a larger area currently leased to JAC by State Government. The survey area is a relatively small rectangular area approximately 600 m in length by 400 m in width, with a 50 m wide access track extending approximately 1200 m to the east. Access to the survey area is via existing tracks, and the general area surrounding the survey area is covered with native vegetation, much of which has been burnt within the past 12 months. There is a disused railway line which runs immediately adjacent and parallel to the proposed access track and northern edge of the survey area. The survey area is comprised of red sand, coastal plain, the majority of which is covered with low, relatively dense, Acacia shrubland.

1.2.2 Surveys required

The biodiversity survey consisted of the following over the survey area:

- Vertebrate fauna survey (basic) and targeted survey, in accordance with EPA Technical Guidance (EPA 2020).
- Reconnaissance level flora and vegetation assessment in accordance with EPA Technical Guidance (EPA 2016). If species of conservation significance were found, a Targeted survey was to be incorporated into the survey.
- The surveys also identify whether any Matters of National Environmental Significance *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are likely to occur within the survey area.

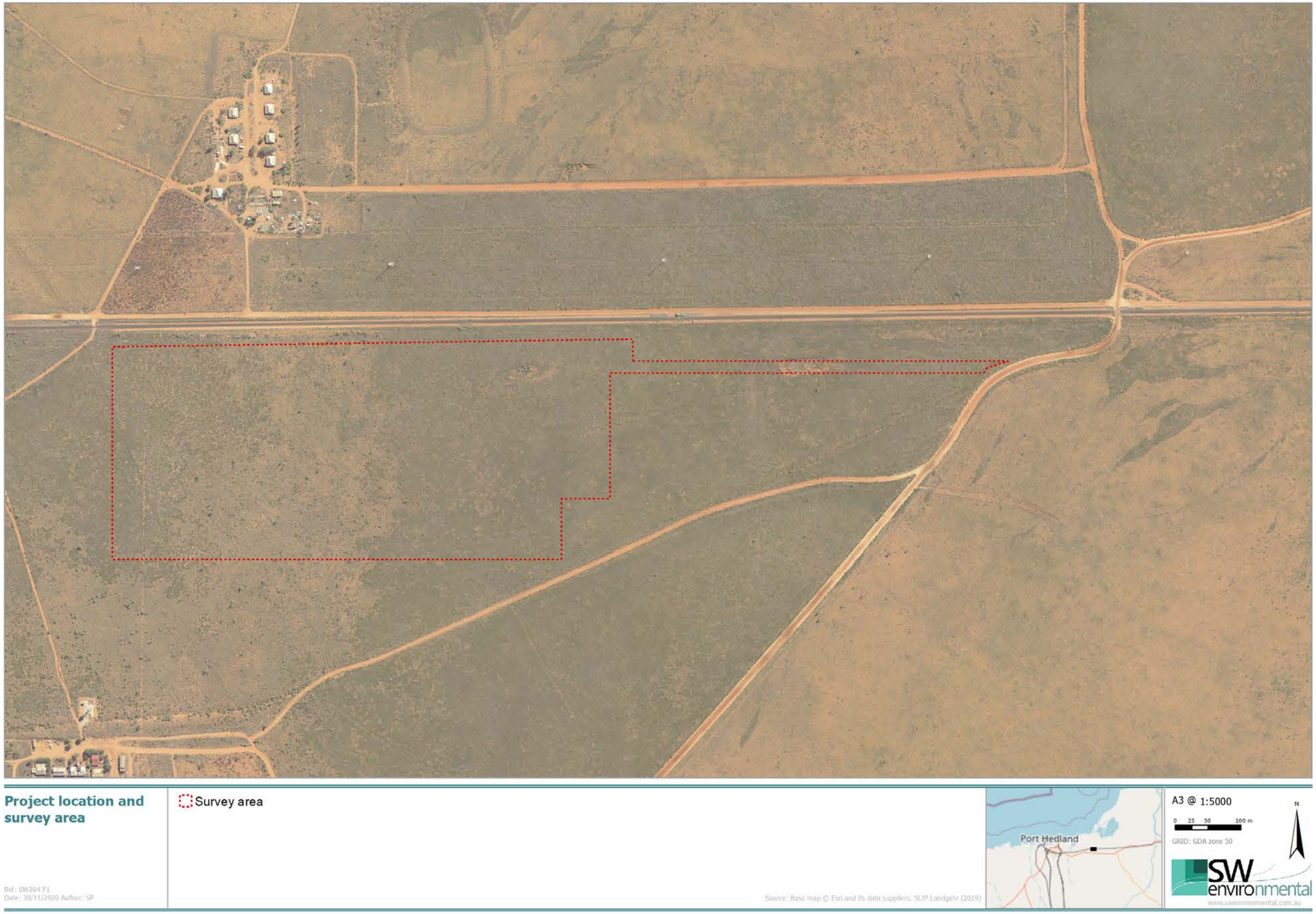


Figure 1. Project location and survey area

1.3 Regulatory context

1.3.1 Key legislation

Key environmental legislation that may be relevant to the biodiversity survey is outlined in Table 1-1.

Table 1-1 Environmental legislation that may be relevant to the project

Legislation	Responsible Government Department	Aspect
Federal Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Federal Department of Agriculture, Water and the Environment (DAWE)	Matters of National Environmental Significance including threatened fauna, flora and communities and environmental offsets.
Biodiversity Conservation Act 2016 (BC Act)	WA Department of Biodiversity, Conservation and Attractions Parks and Wildlife Service (DBCA)	Threatened species habitats, threatening processes, environmental pests and weeds.
Biosecurity and Agricultural Management Act 2007 (BAM Act)	WA Department of Primary Industries and Regional Development	Weeds, feral animals and other pests.
Environmental Protection Act 1986 (EP Act)	Environmental Protection Authority or DWER	Environmental impact assessment and management and offsets.

1.3.2 Fauna, flora and ecological communities

Flora, fauna and ecological communities in WA may be afforded protection under the BC Act and or federal EPBC Act.

Species listed as threatened or migratory under the above legislation are referred to collectively in this document as being 'conservation significant' or 'target' species. These terms include species and communities listed under the DBCA Priority lists.

BC Act

The WA BC Act and associated Regulations provide for the licensing and management of activities that affect biodiversity. The BC Act provides for the listing of threatened native plants (flora), threatened native animals (fauna) and threatened ecological communities that need protection as critically endangered, endangered or vulnerable species or ecological communities because they are under identifiable threat of extinction (species) or collapse (ecological communities).

The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* contain the lists of Threatened, Extinct and Specially Protected species under Part 2 of the BC Act. These are described below.

Threatened species

- CR: Critically endangered species
- EN: Endangered species
- VU: Vulnerable species

Extinct species

- EX: Extinct species
- EW: Extinct in the wild species

Specially protected species

- MI: Migratory species
- CD: Species of special conservation interest (conservation dependent fauna)
- OS: Other specially protected species

Priority species

- Priority 1: Poorly-known species
- Priority 2: Poorly-known species
- Priority 3: Poorly-known species
- Priority 4: Rare, Near Threatened and other species in need of monitoring

A full description of conservation codes is provided in Appendix A.

EPBC Act

In accordance with Commonwealth legislation, the EPBC Act provides a list of 'Matters of National Environmental Significance' (NES), which includes significant fauna, flora, and communities. Under the EPBC Act matters of NES may be listed in any one of the following categories as defined in *Section 179* of the Act:

- Extinct,
- *Extinct in the wild,
- *Critically endangered,
- *Endangered,
- *Vulnerable,
- Conservation dependent.

*Only these categories are matters of NES under the Act.

The EPBC Act also lists migratory species that are recognized under international treaties including the Japan Australia Migratory Bird Agreement (JAMBA), the China Australia Migratory Bird Agreement (CAMBA) and the Bonn Convention (The Convention on the conservation of Migratory Species of Wild Animals). The EPBC Act is regulated by DAWE.

BAM Act

Significant weed species are identified at both the State and National level. At a State level the management of weeds in WA is primarily regulated through the BAM Act. Species listed under this Act

are allocated one of three declared pest categories which define the required level of management (Department of Primary Industries and Regional Development 2019). The Australian Weeds Strategy (Australian Weeds Committee 2012) identifies 'Weeds of National Significance' (WoNS) which have the potential to impact primary industry and/or environmental and social values.

IUCN Red List

The IUCN Red List is an inventory of the global conservation status of species and used to assist DBCA and other agencies in attributing a given threatened species status. It does not have any statutory authority and is not considered in detail in this assessment.

2 Methods

The survey included a Basic / Reconnaissance and Targeted surveys in line with the EPA's Technical Guidance:

- *Technical Guidance – Terrestrial Guidance for Fauna Surveys for Environmental Impact Assessment*. Environmental Protection Authority (2020).
- *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*, Environmental Protection Authority (2016).

The following Guidelines were also considered:

- *Commonwealth Matters of National Environmental Significance – Significant impact guidelines 1.1 Environmental Protection and Biodiversity Conservation Act 1999*, Department of the Environment, Water, Heritage and the Arts (DEWHA)', (2009).

The surveys included the following components:

- Desktop assessment,
- Field validation and habitat assessment,
- Consultation, reporting, mapping, and recommendations.

2.1 Desktop study

A desktop assessment of fauna, flora and vegetation and associated biodiversity values within and near the survey area was undertaken. A key aim of the assessment was to determine the likelihood of any species of conservation significance (target species) occurring within the survey area and the importance of the site to them. Common (non-target) species are also considered more generally.

2.1.1 Flora and Vegetation

Searches for conservation significant flora (Threatened and Priority Flora) and Environmentally Sensitive Areas (ESAs) within 20 km of the survey area were conducted using WA government datasets (Government of Western Australia 2020). TECs and PECs listed by DBCA (DBCA 2020b) were also reviewed to determine if any were likely to be present or analogous with vegetation communities recorded in the survey area.

In addition to these searches, broad-scale information was reviewed and available from Beard (1975) and van Vreeswyk et al (2004) for the Pilbara Region.

Likelihood of Occurrence Assessment

Habitat requirements of conservation significant flora species identified from the database and literature searches were assessed to determine whether suitable habitat was present within the survey locations.

Descriptions of criteria utilised to assess the likelihood of species occurrence within the survey locations are presented in Table 2.1.

Table 2-1 Likelihood of occurrence of Priority Flora criteria.

Likelihood of Occurrence	Desktop Criteria
Likely	• Species has been recorded before in survey area or within 10 km of the survey areas • Known to be present in the survey areas based on site observations (expert advice) • Species has been recorded within the same habitat as occurs in the survey areas
Potential	• Species has been recorded within 20 km of the survey areas • Species reported as known in the survey areas by local community • Species has been recorded within the same habitat type as occurs in the survey areas.
Unlikely	• Species has not been recorded within 20 km of the survey areas • No suitable habitat occurs in the survey areas

Following the survey, the conservation significant flora species identified during the desktop assessment as having the highest potential to occur within the survey locations, but not recorded during the current surveys, were again assessed to determine their likelihood of occurrence within the survey locations. Post-field survey likelihood was primarily based on validating the presence (and thorough inspection) of suitable habitats within each of the survey locations, combined with life form, habitat and flowering information for each flora species.

2.1.2 Fauna

A list of fauna recorded or likely to occur within the survey area has been compiled by a review of available databases and literature including, but not limited to the following data sources:

- Department of Biodiversity, Conservation and Attractions (DBCA) Threatened Fauna Database (NatureMap) (DBCA 2020). A 20 km buffer around the survey area was applied to capture previous fauna records within the immediate vicinity.
- EPBC Act Protected Matters database for fauna of national environmental significance (DAWE 2020). The minimum buffer (1 km) was applied to this search as the databases contains distribution data (areas) and not actual fauna records.
- Literature search and review of other fauna surveys in the vicinity.

2.2 Field surveys

2.2.1 Flora and Vegetation

Weather

In the 12-month period prior to the survey being undertaken, a total of 136.2 mm of rain had been recorded at the Port Hedland weather station (004032) (Bureau of Meteorology 2020). This rainfall is below average for that period (Figure 2).

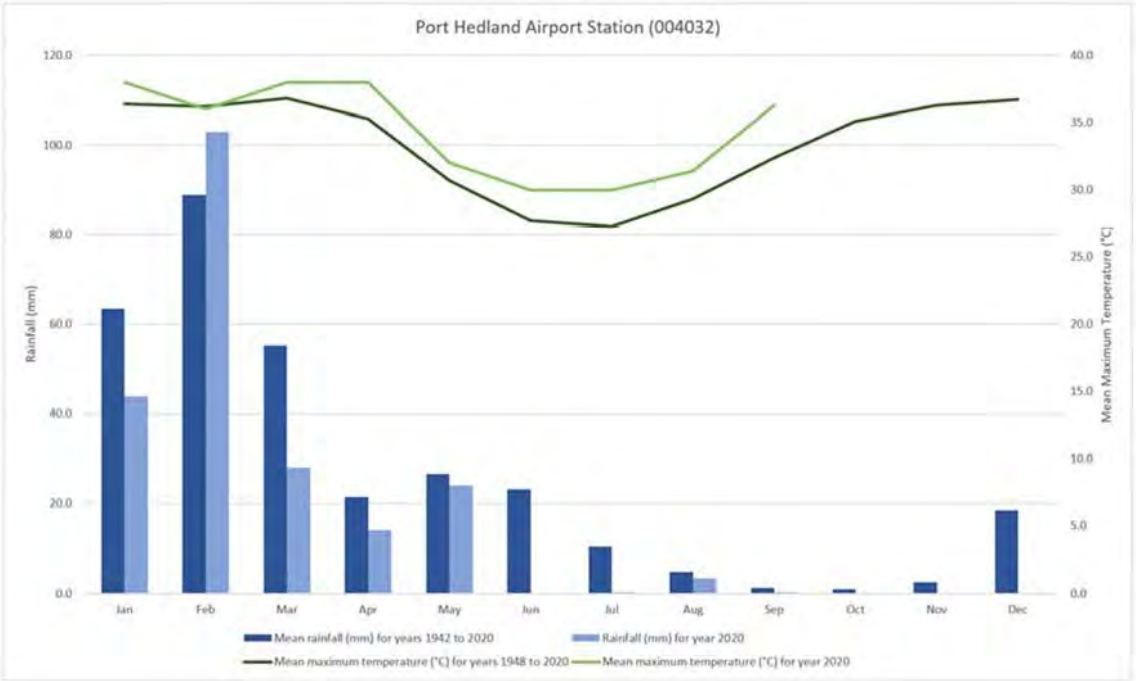


Figure 2. Mean (for years 1940 to 2020) and actual (2020) monthly rainfall and temperature data for Port Hedland Airport weather station (004032) (BOM 2020)

Flora and Vegetation Survey

The field survey was conducted by Principal botanist, Vicki Long (Vicki Long and Associates) (Flora Collection Licence FB62000120) on 6th October 2020. Vicki has conducted numerous flora and vegetation surveys in the Port Hedland area since 1987 and is well qualified to identify vegetation and flora of conservation significance. The survey was undertaken in accordance with the requirements outlined in the Scope of Works provided with each vegetation type being traversed on foot.

Species were identified in the field by the Principal Botanist. Any species not able to be identified in the field were collected, labelled and pressed for later identification by Vicki Long (utilising the Pilbara Regional Herbarium). Priority species identified in the field were noted in the transect description.

Rainfall recorded in the six months prior to the survey totalled 41.4 mm (BOM 2020), which is well below the average of 87mm for this period.

The survey was conducted in accordance with the scope of work detailed in Section 1.2. Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016) was also consulted to ensure consistency with recognised botanical survey guidance in WA.

A minimum of two 50m x 50m quadrats per vegetation type encountered, were sampled to be consistent with regulatory expectations for the Pilbara bioregion.

The following information was collected for each quadrat:

- Location – co-ordinates measured using a hand-held GPS (MGA 50, GDA94). One set of co- ordinates taken from the north-western corner of each quadrat.
- Recorder and date - personnel involved in sampling that location and date.
- Species – all vascular plant species present, including weed species. Species that are not readily identifiable during the field survey will be collected for later identification in the VLA office herbarium, or at the WA Herbarium. GPS co-ordinates were recorded for any conservation significant flora identified.
- Foliar cover – the estimated percent cover for the dominant species in each stratum.
- Vegetation description – vegetation units will be described according to Aplin's (1979) modification of the vegetation classification system of Specht (1970) (Appendix B) and the National Vegetation Information System Level 5 (DAWE 2020a). Vegetation is described to 'association' where up to three dominant genera for each of the upper, mid and ground strata are categorised based on dominant growth form, cover and height.
- Vegetation condition –vegetation condition adapted by Trudgen (1988) (Appendix B).
- Habitat – a broad landscape description based on landform, topography and soil.
- Disturbance – records of any obvious disturbances such as fire, tracks, weed infestations.
- Photographs – a photograph will be taken of each quadrat and vegetation unit.

A revision to the solar farm and access track footprint was made in May 2021. This revision resulted in southern boundary of the solar area being reduced but an equivalent area added to the eastern boundary. The access track was shortened and narrowed considerably. Field Mapping Note MN01 was made within the south-eastern most corner of the new solar boundary, confirming the vegetation type found there.

2.2.2 Fauna

The field component of the fauna assessment was carried out on the 7th September 2020 and 13th May 2021 by Greg Harewood (Zoologist) and consisted of a reconnaissance survey, described in the sections below. About 11.5 km of foot transects were completed during the survey.

Habitat assessment

The objective of the habitat assessment was to assess the likelihood of species of conservation significance utilising the habitats identified within the survey area.

During the field survey, fauna habitats within the survey area were assessed, and specific elements identified, which informed the likelihood of listed conservation significant species utilising the area and fauna habitat significance.

Vegetation units, landforms and soils identified during a flora and vegetation survey of the site (VLA 2020) were used to define broad fauna habitat types across the survey area. This information was supplemented by observation made during the fauna reconnaissance survey.

Fauna habitat quality was based on Table 2-2. Representative site photos are shown in Table 4.1.

Table 2-2 Fauna habitat quality categories and descriptions (SW Environmental, undated).

Quality	Description
Good	• Native vegetation with intact and diverse habitat structure. Different vegetation age classes present at most stratum levels (ground, understorey, midstorey, canopy). • Forest/woodland: abundant hollow-bearing trees, including those with or likely to develop large hollows. Mature trees offer more foraging resources (nectar/seed). • Presence of shelter/refuges at ground level (dense understorey plants, tussock, rocky outcrop, hollow logs). • High habitat complexity (ecotones between vegetation types or habitat mosaic). This increases the range of foraging and shelter opportunities within a habitat. • Presence of key foraging and microhabitat components for target species. • Little to no obvious weed invasion or evidence of grazing. • May be large patch and/or connected to other areas of native vegetation.
Moderate	• Native flora species dominant with moderate habitat structure complexity appropriate to vegetation type. Ground litter intact or slightly disturbed. More than one age class present. • Forest/woodland: low to moderate abundance of hollow-bearing trees or trees likely to develop hollows. • Some shelter and refuge present for ground dwelling fauna. • Some habitat complexity (ecotones between vegetation types or areas forming a habitat mosaic). • Marginal presence of key microhabitat components for target species. • May be small or large in scale, and isolated or well connected.
Poor	• Habitat highly disturbed and simplified with low structural complexity. Ground litter layer absent or highly modified. Complexity reduced by only one age class present. • Little or no shelter and refuge for ground dwelling fauna. • Forest/woodland: not likely to support hollow-bearing trees. • Lack of key foraging and microhabitat components for target species. • May have evidence of weed invasion or grazing. • May be narrow or small area and substantially influenced by edge effects, and isolated from other areas of native vegetation.

Fauna observations

The aim of this part of the assessment was to obtain enough information to assess the likely significance of the survey area to fauna species of conservation significance.

Based on the results of the literature review, evidence of the presence or likely presence of fauna species of conservation significance known to or likely to frequent the general area was searched for and recorded during the field survey.

This included but was not limited to:

- Undertaking a series of close spaced, on foot transects across the survey area.

- Searching for evidence (i.e. individuals, tracks, scats, calls) of potential conservation significant species under logs, rocks and leaf litter.
- Observing bird species with binoculars.

2.3 Limitations

In accordance with *Technical Guidance* (EPA 2016 and EPA 2020) potential survey limitations are identified below.

Table 2-3 Limitations of survey adequacy and accuracy

Aspect	Constraint	Comment
Sources of information and availability of contextual Information- Is the region well documented?	No	Previous biological surveys have been conducted in the broader regional area, and broad-scale information is available from Beard (1975) and van Vreeswyk et al. (2004). Contextual information is therefore not a limiting factor for this survey.
Competency / experience of the survey team, including experience in the bioregion surveyed	No	Suitably qualified individuals carried out the work. The zoologist Greg Harewood is an experienced field surveyor (20 years plus) and has carried numerous projects in the Pilbara. The field botanist responsible for undertaking the field survey has considerable (35 years) experience in conducting vegetation and flora surveys along the Pilbara/Carnarvon/Kimberley coastline including offshore islands. Personnel experience was not considered a limiting factor.
Scope, e.g. where faunal groups were excluded from the survey, was there adequate time to complete the surveys to the desired standard?	No	The scope is adequate to provide the information required to support a clearing assessment. Fish and invertebrates were outside of the project scope. There was adequate time to complete the flora surveys and conduct targeted searches for Threatened and Priority flora within identified preferred habitats and landforms within the survey area. Time was not considered a limiting factor.
Proportion of flora and fauna identified, recorded and/or collected?	Negligible	The single survey was considered adequate despite conditions being dry. The field botanist is very experienced with Pilbara coastal flora having worked with it for over 35 years. Some perennial species were dormant, some defoliated but their particular habit still allowed the field botanist to determine their identity in most cases. Some annual species were beyond being identifiable and some were considered to be potentially absent. However, the survey area is small and the proportion of species identified was considered to be adequate for that habitat
Adequacy of the survey intensity and proportion of survey achieved	No	Suitable survey effort has been adopted to identify the constraints associated with the survey area. A precautionary approach has also been adopted. No seasonal sampling was carried out as part of this fauna assessment. The conclusions presented are based upon

Aspect	Constraint	Comment
		field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of the field assessments. It should be recognised that site conditions can change with time. Lack of observational data on some species should also not necessarily be taken as an indication that a species is absent from the site or does not utilise it for some purpose at times.
The proportion of the task achieved and further work / Completeness of the survey	No	The surveys were completed adequately, to a sufficient level with respect to the scope. The survey area was considered adequately surveyed to compile a representative list of flora species, (including Priority and introduced flora species), as well as describe vegetation at a level appropriate for management decisions. A complete list of annual species could not be made due to dry conditions. However, because the survey area is small it is considered these annual species will be well represented in similar habitat/vegetation types which are quite extensive in areas surrounding the survey area. The survey area was comprehensively surveyed and as such completeness is not a limiting factor.
Mapping reliability	No	Colour aerial photography at a scale of 1:5,000 was used to locate the survey area and to assist in navigation and delineation of vegetation boundaries. The aerial photography was of good resolution and, in general, accurately represented ground conditions. As such mapping reliability was not considered a limiting factor.
Timing/weather/season	Low	The survey was conducted during a dry period. Rainfall had not been received for 5 months prior to the survey and hot weather was experienced in August and September. Prior to May, low rainfall was received in January, March and April, and while 102 mm was received in February, it occurred over a period of 2 days which is not considered effective rainfall. It is estimated that a further 25% of flora would be recorded following significant rain.
Disturbances that may have affected results of survey	Negligible	Approximately 40% of the access track had been subject to fire. The survey area is particularly small, any disturbance is historical and not seen as a limitation to what is currently present.
Intensity (in retrospect, was the intensity adequate)	No	The intensity of the survey was considered adequate to compile representative species lists. Intensity was not considered a limiting factor.
Completeness (e.g. was relevant area fully surveyed)	No	The entire area was accessed and surveyed.
Resources	No	Resources were adequate to complete the survey and all appropriate tools and materials required to complete the task were available. Resources were not considered a limiting factor.
Access problems	No	The entire survey area was accessible and was traversed in its entirety by foot.

3 Desktop study

3.1 Local and regional context

3.1.1 Interim Biogeographic Regionalisation of Australia (IBRA) values

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies Australia's landscapes into 89 large geographically distinct bioregions (419 subregions) based on climate, geology, landform, native vegetation and species information. The survey area lies within the Pilbara Bioregion (PIL). There are four biological sub-regions within the Pilbara bioregion. The survey area is within the PIL 04 Roebourne sub-region which is described as:

> Quaternary alluvial and older colluvial coastal and sub-coastal plains with a grass savannah of mixed bunch and hummock grasses and dwarf shrub-steppe of *Acacia stellaticeps*, or *A. pyrifolia* and *A. inaequilatera*. Uplands are dominated by *Triodia* hummock grasslands. Ephemeral drainage lines support *Eucalyptus victrix* or *Corymbia hamersleyana* woodlands. Samphire, Sporobolus and mangal occur on marine alluvial flats and deltas. Resistant linear ranges of basalts occur across the coastal plains, with minor exposures of granite. Islands are either Quaternary sand accumulations or composed of basalt or limestone, or combinations of any of these three. The sub-region experiences an arid (semi-desert) tropical climate with highly variable rainfall, often influenced by cyclonic activity in the north-west of WA and falling during the summer (Kendrick and Stanley, 2001).

3.1.2 Land Systems

The survey area falls within the 'Uaroo' Land System which is described by van Vreeswyk et al. 2004 as: 'Broad sandy plains supporting shrubby hard and soft spinifex grasslands'.

3.1.3 DBCA managed lands

There are no nearby DBCA managed reserves (SLIP 2020). The nearest is over 75 km away.

3.1.4 Habitat connectivity, linkage, or corridor values

In a local context nearly the entire area within 10km of the project is mapped as continuous native vegetation (Government of Western Australia 2019). The project will not impact local habitat connectivity, linkage, or corridor values.

3.1.5 Important Bird Areas (IBA)

Important Bird Areas (IBAs) are areas identified by Birdlife International. IBAs are considered conservation priorities, sites able to be conserved in their entirety and are usually part of a protected-area network or recognised as having global bird conservation importance (Birdlife International, 2020). The Port Hedland Saltworks IBA, an intertidal mudflat, occurs eight kilometres north east of the project but will not be impacted.

3.2 Environmental values of the survey area

3.2.1 Wetlands and watercourses

The term 'wetlands' refers to damplands, estuary-peripheral and water body, floodplains, palusplain and sumplands. The wetland categories are recognised by the EPA, DBCA, DWER and other decision making authorities. There are no wetlands or watercourses mapped within or near with the survey area.

3.2.2 Vegetation

Vegetation mapping

The vegetation of the survey area falls within Beard's Vegetation Association Abydos Plain_647 which is described as "Hummock grassland with scattered shrubs or mallee *Triodia spp. Acacia spp., Grevillea spp. Eucalyptus spp*".

Vegetation of Conservation Significance

No TECs or PECs have been previously recorded within the survey area. Database search results indicate that the closest recorded TEC/PECs are located approximately 107 km south-west and 131 km north-east of the survey area (Government of Western Australia 2020). Neither of these areas of significance will be impacted by the proposed clearing activities.

3.2.3 Flora

Database search results indicated that no Threatened (T) flora species, one Priority (P) P1 and three P3 species have been recorded within 20 km of the survey locations (DBCA 2020c). Of the four Priority flora species identified from the desktop assessment, the Priority 1 *Tephrosia rosea subsp Port Hedland* and two P3 species, *Heliotropium muticum* and *Rothia indica subsp. australis* are considered to have potential to occur in the survey area, based on pre-survey assessment of previous location and preferred habitat information. The likelihood of occurrence assessment is provided below.

Table 3-1 Likelihood of occurrence of Threatened and Priority flora recorded within 20 km of the survey area (DBCA 2020c).

Species	Habit and flowering information	Life form	Habitat	Likelihood of occurrence	
				Pre-survey	Post-survey
Threatened (Declared Rare Flora)					
Not applicable					
Priority 1					
Tephrosia rosea var. Port Hedland (AS George 1114)	Erect spreading shrub 60-120 cm, dull green-silver, flowers (September) deep pink	Perennial	Very rare and only recorded on dunes near Point Samson / Sam's Creek, Finucane Island and East of Port Hedland Airport, sand plains between Port Hedland and South Hedland	Likely	Unlikely
Priority 3					
Eragrostis crateriformis	Tussock grass	Perennial	Floodplain with red-brown loamy clays; claypans;	Unlikely	Unlikely
Heliotropium muticum	Ascending to spreading herb, to 0.3 m high	Perennial	Loam, sandy loam on plains and floodplains.	Likely	Likely - Recorded adjacent to survey area
Rothia indica subsp. australis	Prostrate herb, to 0.3 m high, densely covered in spreading hairs. Fl. Apr to Aug.	Annual	Sandy soils. Sandhills and sandy flats	Likely	Likely

3.2.4 Fauna

The literature review identified multiple fauna species of conservation significance as potentially occurring in the general area as listed in Table 3.2. The NatureMap (DBCA 2020) and Protected Matter Search Tool (DAWE 2020) results, used as a primary source for compiling this listing, are provided in Appendix D. Because of the proximity of the survey area to the ocean a number of conservation significant marine species have appeared in the database search results. These species have been excluded from the assessment as they would not under normal circumstance occur within the survey area given a total lack of suitable habitat.

Table 3-2 Threatened and Priority fauna that may occur within the survey area (DBCA 2020, DAWE 2020)

Species	Conservation Status[1]	
	BC Act / DBCA Priority	EPBC Act
Airlie Island Ctenotus *Ctenotus angusticeps*	P3	-
Pilbara Olive Python *Liasis olivaceus barroni*	S3	VU
Migratory Shorebirds/Seabirds/Wetland Species	Various	Various
Oriental Pratincole *Glareola maldivarum*	S5	Mig
Barn Swallow Hirundo rustica	S5	Mig
Eastern Osprey *Pandion cristatus*	S5	Mig
Peregrine Falcon *Falco peregrinus*	S7	-
Grey Falcon *Falco hypoleucos*	VU	VU
Night Parrot *Pezoporus occidentalis*	CR	CE
Fork-tailed Swift *Apus pacificus*	S5	Mig
Grey Wagtail *Motacilla cinerea*	S5	Mig
Yellow Wagtail *Motacilla flava*	S5	Mig
Northern Quoll *Dasyurus hallucatus*	S2	EN
Bilby *Macrotis lagotis*	S3	VU
Brush-tailed Mulgara *Dasycercus blythi*	P4	-
Western Pebble-mound Mouse *Pseudomys chapmani*	P4	-
Ghost Bat *Macroderma gigas*	S3	VU
Pilbara Leaf-nosed Bat *Rhinonicteris aurantia*	VU	VU

[1] See Appendix A for conservation codes

4 Results

4.1 Vegetation

4.1.1 Vegetation types

The survey area comprises of two vegetation types:

- *Acacia stellaticeps* open heath, sometimes low shrubland over *Triodia schinzii* with *Triodia epactia* hummock grassland, sometimes open hummock grassland, and
- *Owenia reticulata, Dolichandrone occidentalis* open low woodland often with *Atalaya hemiglauca* and *Acacia colei* tall shrubs, over *Acacia stellaticeps* open low shrubland over *Triodia schinzii* hummock grassland.

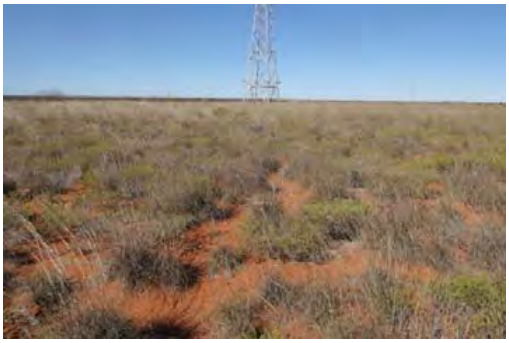
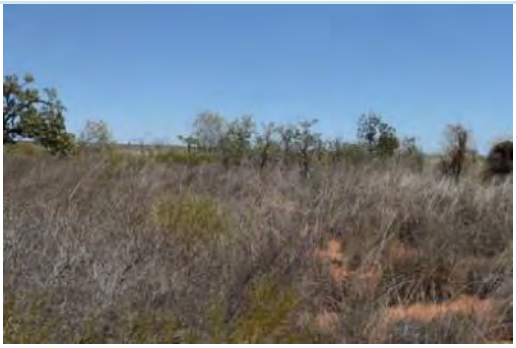
The first vegetation type occupies two-thirds of the survey area with *Acacia stellaticeps* being so dense, it appears to be preventing the establishment and growth of other species. This vegetation type occurs along the proposed access track, including the revised extension to the eastern boundary (2021), with forty percent of the eastern end having been burnt. The area has experienced a history of frequent fires, which have encouraged the dense growth of *Acacia stellaticeps*. Following fire, this species is known to coppice from the base and will also regenerate profusely from seed. (B. Maslin, worldwidewattle.com).

The second vegetation type present may represent a remnant of a less fire impacted area. This vegetation type was more species diverse. Many annual species were evident, although most were dead and many not identifiable. The tree species, *Owenia reticulata* is present in this vegetation type along with small trees/tall shrubs of *Dolichandrone occidentalis*, and *Atalaya hemiglauca*. These species are tropical remnants.

Both vegetation types recorded are broadly consistent with those described for the Uaroo Land System under the sandy, loamy plains landform, although that description does not include the tree species listed above (van Vreeswyk et al. 2004).

The vegetation types are summarised in Table 4-1 along with representative photos of each, and their distribution within the survey area is shown on Figure 3.

Table 4-1 Vegetation types present within the survey area (VLA, 2020)

Code	Description	Sites	Condition	Photo
AsTsTe	*Acacia stellaticeps* open heath, sometimes low shrubland over *Triodia schinzii* with *Triodia epactia* hummock grassland, sometimes open hummock grassland.	1, 1a, 1b, 1c, 1d (burnt) and MN1	Good	 Plate 1: *Acacia stellaticeps* open heath over open hummock grassland - typical  Plate 2: *Acacia stellaticeps* low shrubland over open hummock grassland.  Plate 3: Recently burnt, now regenerating AsTsTe
OrDoAsTs	*Owenia reticulata, Dolichandrone occidentalis* open low woodland often with *Atalaya hemiglauca* and *Acacia colei* tall shrubs over *Acacia stellaticeps* open low shrubland over *Triodia schinzii* hummock grassland.	2, 2a, 3	Excellent <2% *Cenchrus ciliaris,* *C. setiger* beneath *Owenia* trees. 1 x large *Aerva javanica* plant only beside an old *Owenia* stump	 Plate 4: OrDoAsTs where low trees are more dense

Code	Description	Sites	Condition	Photo
				 Plate 5: OrDoAsTe where tall trees are less dense
Cleared	*Existing disturbed areas (roads/rail line)*	N/A	Cleared, Completely Degraded	 Plate 6: Existing disturbed areas (roads/rail line)

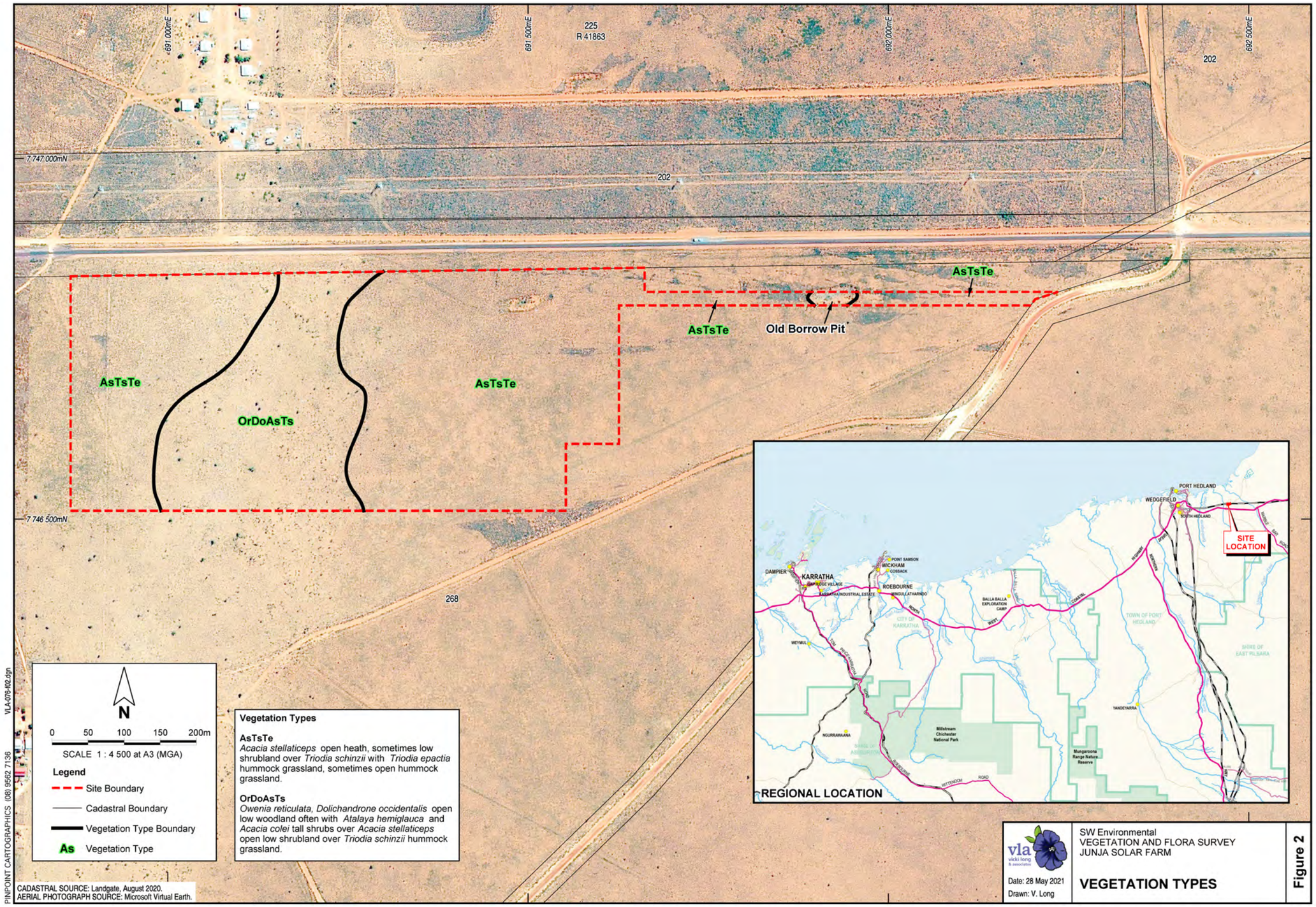


Figure 3. Vegetation types (and corresponding fauna habitat types) (VLA, 2021).

4.1.2 Vegetation condition

Vegetation condition was assessed using the Trudgen (1988) condition scale (Appendix B), as recommended by the EPA (2016). It is rated predominantly on external factors such as man-made disturbance, fire, clearing, grazing and A and does not account for seasonality (dry conditions where flora may be dormant and dry) or the impacts of natural events such as coastal processes and cyclones.

The vegetation at the time of this survey was dry, with many dormant species (some species were leafless, whilst annuals were mostly dead); this however does not influence the Vegetation Condition Score. The very low number and cover of weed species found on the survey area would generally be associated with an "Excellent" score. However, a long history of fire events, evidenced by the dominance of a single species, *Acacia stellaticeps*, over two thirds of the survey area, has resulted in a lower condition score of "Good". The low shrubland, which is a result of frequent fire events over time, is very dense and prevents the establishment of other species, hence the very low species diversity in the area.

4.2 Flora

4.2.1 Flora recorded

Species diversity is relatively low throughout the survey area. A total of 53 taxa were recorded during the survey representing 23 families. A complete list of the flora identified in the survey area during this survey is summarised in Appendix C.

Forty four of the plants recorded were perennial, with more annual species likely to be present following decent rain. The most well represented family was Fabaceae (pea family) with nine species and the next represented family was Poaceae (grasses) with eight species. The species recorded are all typically found around the Port Hedland region.

The low species numbers are probably due to the dry conditions and below average rainfall in the six months preceding the survey, as well as the dense *Acacia stellaticeps* heath which covers two-thirds of the survey area, inhibiting the establishment and growth of other species.

Pindan sand usually produces many short-lived ephemerals and annuals following rain and it is expected more flora would be present following a season of adequate and effective rainfall.

4.2.2 Conservation significant flora

No Priority species were found within the survey area, but approximately 50-100 dead P3 *Heliotropium muticum* were recorded along the northern windrow of the existing track at GPS location 691538E 7746892N outside of the project. This area had been subject to fire within the previous 12 months. The 2021 revision of the track width excludes this windrow entirely so this population of *Heliotropium muticum* should be avoided completely.

4.2.3 Weeds

The most commonly recorded weeds were buffel grass (**Cenchrus ciliaris*) and birdwood grass (**Cenchrus setiger*) which occurred in densities well below 2% of total vegetation for the majority of the survey area. A borrow pit occurs midway along the proposed access track as shown in Figure 1. This pit is about 1.25 m deep, with the floor of the pit supporting a dense population of approximately 30% **Cenchrus setiger*, which is a lot greater than the rest of the survey area.

A single kapok (**Aerva javanica*) plant was found at GPS location 691123E 7746772N. It was mature and seeding abundantly in association with birdwood grass (**Cenchrus setiger*), near an old *Owenia reticulata* tree stump.

None are listed as WoNS or specifically requiring management under the BAM Act.

4.3 Fauna

4.3.1 Fauna habitat

Fauna habitats (largely based on vegetation units mapped by VLA 2021) are shown in Figure 3. Example images of each of the identified units are provided in Table 4-1.

The survey area is located on coastal, red sand plain, the majority of which is covered with low, relatively dense, Acacia shrubland. One section contains some widely scattered, relatively small trees and as a consequence has been mapped as an open low woodland. An area in the eastern part of the survey area shows signs of being recently burnt. A small section of the survey area is represented by existing cleared roads/access tracks.

The survey area contains no wetlands, watercourses, rock outcrops, caves or fallen hollow logs. Leaf litter is generally absent or very sparse and trees contain no hollows of note.

Given the relatively small size of the survey area (25.7 hectares) and the lack of habitat variety, the total fauna assemblage present is likely to be depauperate as a consequence. The assemblage is also unlikely to be remarkable in any sense given that similar fauna habitats are extensive in the wider area. Given the nature of the fauna habitats present and the survey areas small size some fauna species, which would not typically reside in the survey area itself, in particular those that occur at low densities but have a large home range, may occasionally be encountered. Overall, the fauna habitat quality was considered to be Poor.

4.3.2 Fauna recorded

Seventeen fauna species were observed, or secondary evidence of their presence recorded during the field survey (Appendix C). The low number of fauna species observed can largely be attributed to the survey areas small size and limited habitat variety. The majority of the fauna recorded are common widespread bird species.

Secondary evidence of the northern quoll (Endangered) was found in the form of a scat (Photo 1). No other evidence of the species was seen. It is considered unlikely that this species permanently resides

within the survey area given there is a total lack of refuge habitat (i.e. caves, rock outcrops, hollow logs/trees or large burrows).

Photo 1 Northern Quoll Scat found within the survey area

No evidence of any other fauna species of conservation significance identified during the literature review was observed. However, this does not eliminate the potential for some species to still occur, if only infrequently.

4.3.3 Conservation significant fauna

Based on the information gathered during the site reconnaissance survey and the documented distribution and habitat preferences of the species of conservation significance identified as potentially being present in the general area, their likelihood of occurrence within the survey area itself has been assessed following fieldwork. A summary is provided below in Table 4-2.

Table 4-2 Fauna of conservation significance likelihood of occurrence following fieldwork

Species	Conservation Status		Habitat Preferences	Habitat Present	Likelihood of Occurrence	Comments/Possible Impacts
	BC Act / DBCA Priority	EPBC Act				
Airlie Island Ctenotus *Ctenotus angusticeps*	P3	-	On the mainland, generally inhabits the landward fringe of salt marsh communities in samphire shrubland or marine couch grassland in the intertidal zone along mangrove margins.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Pilbara Olive Python *Liasis olivaceus barroni*	S3	VU	Prefers escarpments, gorges usually in close proximity to water and rock outcrops that attract suitable sized prey species.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Migratory Shorebirds/Wetland Species	S5, Various	Ma, Mig, Various	Varies between species but includes open ocean, beaches and permanent/temporary wetlands varying from billabongs, swamps, lakes, floodplains, sewerage farms, saltwork ponds, estuaries, lagoons, mudflats sandbars, pastures, airfields, sports fields and lawns.	No	Would Not Occur.	No suitable habitat. No impact on these species will occur.
Oriental Pratincole *Glareola maldivarum*	S5	Mig	Usually inhabits open plains, floodplains or short grassland (including farmland or airstrips), often with extensive bare areas and near water.	No/Marginal	Unlikely to Occur.	abitat appears marginal at best. No impact on this species is anticipated.
Barn Swallow *Hirundo rustica*	S5	Mig	Open country in coastal lowlands, often near water in or over freshwater wetlands, paperbark *Melaleuca* woodland, mesophyll shrub thickets and tussock grassland.	Yes/Marginal (foraging habitat only)	Unlikely to Occur, Occasional flyover only.	Unlikely to occur except on very rare occasions for a limited period. No impact on this species is anticipated.
Eastern Osprey *Pandion haliaetus*	S5	Ma, Mig	Coasts, estuaries, bays, inlets, islands, and surrounding waters, coral atolls, reefs, lagoons, rock cliffs and stacks. Ascends larger rivers.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Peregrine Falcon *Falco peregrinus*	S7	-	Diverse from rainforest to arid shrublands, from coastal heath to alpine Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes.	Yes (foraging habitat only)	Possibly Occurs, but only on very rare occasions for limited periods.	Uncommon but the survey area may represent part of a larger home range used by individuals of this species. No significant impact on this species anticipated.

Grey Falcon *Falco hypoleucos*	VU	VU	Lightly treed plains, gibber deserts, sand ridges, pastoral lands, timbered water courses but seldom in driest deserts. Typically nest in tall eucalypt trees near water	Yes (foraging habitat only)	Possibly Occurs, but only on very rare occasions for limited periods.	Uncommon but the subject site may represent part of a larger home range used by individuals of this species. No significant impact on this species anticipated.
Night Parrot *Pezoporus occidentalis*	CR	CE	Preferred habitat is thought to be spinifex grasslands or samphire and chenopod shrublands on claypans, floodplains or the margins of salt lakes, creeks or other water bodies.	No/Very Marginal	Unlikely to Occur.	abitat appears very marginal at best. No impact on this species is anticipated.
Fork-tailed Swift *Apus pacificus*	S5	Mig, Ma	Low to very high airspace over varied habitat from rainforest to semi desert.	Yes (foraging habitat only)	Unlikely to Occur, Flyover only on very rare occasions.	May occur very occasionally for brief periods. Entirely aerial. No impact on this species will occur.
Grey Wagtail *Motacilla cinerea*	S5	Mig, Ma	In Australia, near running water in disused quarries, sandy, rocky streams in escarpments and rainforest, sewerage ponds, ploughed fields and airfields.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Grey Wagtail *Motacilla cinerea*	S5	Mig	Near running water in disused quarries, sandy, rocky streams in escarpments and rainforest, sewerage ponds, ploughed fields and airfields.	No	Would Not Occur. Very uncommon vagrant.	No suitable habitat. No impact on this species will occur.
Yellow Wagtail *Motacilla flava*	S5	Mig	Short grass and bare ground, swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land town lawns.	No	Would Not Occur. Very uncommon vagrant.	No suitable habitat. No impact on this species will occur.
Northern Quoll *Dasyurus hallucatus*	S2	EN	Can occur in a variety of habitats across their range. Important areas include rocky hills, scree slopes and river systems/creek lines which have larger hollow bearing trees. Other areas surrounding the above mentioned "important" habitats including open spinifex meadows, gibber plains, hill systems and similar landforms that provide foraging habitat	Yes/Marginal (foraging habitat only)	Known to Occur	Recorded within the survey area but only likely to be present as occasional transients for short periods. Loss/modification of a small area of marginal foraging habitat.
Bilby *Macrotis lagotis*	S3	VU	Acacia shrublands, spinifex and hummock grassland. Mitchell grass and stony downs country if cracking clay, also desert sand plains and dune fields sometimes with spinifex hummock grassland and acacia shrubland	Yes	Possibly Occurs	Known to occur in wider area, however no evidence (e.g. burrows) observed within survey area. Loss/modification of a small area of potential habitat.

Brush-tailed Mulgara *Dasycercus blythi*	P4	-	Occurs in a range of vegetation types including hummock grass plains, sand ridges, mulga shrubland on loamy sand, however, the principal habitat is mature hummock grasslands of spinifex, especially *Triodia basedowii* and *T. pungens* where it lives in burrows that it digs on the flats between low sand dunes.	Yes/Marginal	Possibly Occurs	Known to occur in wider area, however no evidence (e.g. burrows) observed within survey area. Habitat appears to be generally marginal (i.e. sparse spinifex). Loss/modification of a small area of potential though marginal habitat.
Western Pebble-mound Mouse *Pseudomys chapmani*	P4	-	Stony hillsides with hummock grassland.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Ghost Bat *Macroderma gigas*	S3	VU	Requires undisturbed caves, rock piles and mine shafts for roosting. They forage for food over a wide range of habitats including arid spinifex hillsides, black soil grasslands, monsoon forest, open savannah woodland, tall open forest, deciduous vine forest and tropical rainforest.	No/Marginal (foraging habitat only)	Unlikely to Occur.	Unlikely to occur except on rare occasions for a limited period. No impact on this species is anticipated.
Pilbara Leaf-nosed Bat *Rhinonicteris aurantia*	VU	VU	During the dry season this species roosts in caves and mine adits with stable, warm and humid microclimates. It is thought that forest areas can be used in the wet season if conditions are hot and humid	No/Marginal (foraging habitat only)	Unlikely to Occur.	Unlikely to occur except on very rare occasions for a limited period. No impact on this species is anticipated.

One vertebrate fauna species of conservation significance was identified from the survey area:

- Northern Quoll *Dasyurus hallucatus* – S2 (*BC Act*), Endangered (*EPBC Act*).

A scat was found within the survey area during the daytime reconnaissance survey. No other evidence of the species was seen. It is considered unlikely that this species permanently resides within the survey area given there is a total lack of refuge habitat (i.e. caves, rock outcrops, hollow logs/trees or large burrows) and the animal which laid the scat was probably in transit between more suitable areas or foraging across its home range. The proposed solar development will result in the loss/modification of a small area of potential foraging habitat used by this species, but impact is unlikely to be significant given the areas small size and large expanses of similar habitat in adjoining areas.

Several additional species of conservation significance may utilise the survey area for some purpose at times, but their status on-site and/or in the general area is difficult to determine because they were not sighted during the field survey, or evidence of use was not observed:

- Barn Swallow *Hirundo rustica* – S5 (*BC Act*), Migratory (*EPBC Act*)

Listed as a potential species based on available information however actual status in the general area is difficult to determine. The species is however only likely to occur on rare occasions and then only for brief periods. The species is largely aerial and survey area lacks roost sites. No/negligible impact on this species anticipated.

- Peregrine Falcon *Falco peregrinus* – S7 (*BC Act*)

Listed as a potential species based on available information. This species potentially utilises some sections of the survey area for foraging as part of a much larger home range though it is only likely to occur infrequently and then only for brief periods. No potential nest sites. No/negligible impact on this species anticipated.

- Grey Falcon *Falco hypoleucos* – S3 (*BC Act*), Vulnerable (*EPBC Act*)

Listed as a potential species based on available information. This species potentially utilises some sections of the survey area for foraging as part of a much larger home range though it is only likely to occur infrequently and then only for brief periods. No potential nest sites. No/negligible impact on this species anticipated.

- Fork-tailed Swift *Apus pacificus* – S5 (*BC Act*), Migratory (*EPBC Act*)

Listed as a potential species based on available information however actual status in the general area is difficult to determine. The species is however only likely to occur on rare occasions and then only for brief periods. The species is largely aerial and survey area lacks roost sites. No/negligible impact on this species anticipated.

- Bilby *Macrotis lagotis* – S3 (*BC Act*), Vulnerable (*EPBC Act*)

Listed as a potential species based on available information, however no evidence of the species presence (e.g. burrow, scats or tracks) observed during the survey period suggesting that at the time it was absent from the site. The proposed solar array development will result in the loss/modification of a small area of potential habitat for this species, but impact is unlikely to be significant given the areas small size and large expanses of similar habitat in adjoining areas.

- Brush-tailed Mulgara *Dasycercus blythi*. - P4 (DBCA Priority Species)

Listed as a potential species based on available information, however no evidence of the species presence (e.g. burrow, scats, or tracks) observed during the survey period suggesting that at the time it was absent from the site. The proposed solar development will result in the loss/modification of a small area of potential habitat for this species, but impact is unlikely to be significant given the areas small size and large expanses of similar habitat in adjoining areas.

A number of other species of conservation significance (as listed in Table 4-2), while possibly present in the wider area (in particular in nearby rocky ranges) are not listed as potentially occurring within the survey area primarily due to a complete lack of suitable habitat (quality and extent) and/or known local/regional extinction.

In cases where some habitat is present and available information indicates at least some probability of the species occurrence, likely impacts are anticipated to be very low/no-existent due to the small area of clearing required and the large expanses of adjoining and nearby similar and in some cases better quality habitat.

No overall change in the conservation status of any fauna species currently or potentially utilising the survey area is therefore anticipated. While some small, localised residual loss of fauna habitat may occur for some species, regional impacts on the status of any one species are anticipated to be negligible/non-existent.

5 Discussion and Recommendations

5.1 Flora and Vegetation

The vegetation recorded within the survey area is relatively widespread within the Uaroo Land System, both to the east and west of Port Hedland. Two thirds of the survey area is occupied by low heath of *Acacia stellaticeps*, which inhibits the establishment and growth of other species, resulting in a low species diversity within that vegetation type. Additionally, the survey area is small, hence the removal of vegetation via clearing will not have a significant impact on this vegetation type. The second vegetation type recorded, is more species diverse and is less well represented in the wider area. Scattered to open *Owenia reticulata* trees over tall and low Acacia shrubland is relatively widespread throughout the surrounding area, however, the abundance of *Dolichandrone occidentalis* in the survey area makes it less common.

Dolichandrone occidentalis tends to occur in isolated groves (one of which occurs in the survey area) with the frequency of occurrence of these groves increasing, as you travel further north (V Long pers obs).

The survey was undertaken as a dry season survey. Plants were dry, defoliated, dormant or dead. Most annual species were senesced and although some could be identified from persisting material, some were unidentifiable. Many perennials had died back significantly, were without flowering or fruiting material and many had partially defoliated. Most were identifiable, but a lack of flowering or fruiting material meant that identifications could not be verified. However, the survey area is small, and it is probable that all component species of the two vegetation types recorded, would be well represented in the relatively widespread vegetation types in the surrounding region. Pindan sand generally produces

a relatively diverse range of species following rainfall and it is estimated a further 25% of flora would be recorded following a significant rainfall event, enabling the verification of any questionable species.

Three of the four Conservation Significant plant species known to occur within 20 km of the survey area are categorised as P3 annuals, two of which may be present following rainfall. A population of about 50- 100 dead plants of P3 *Heliotropium muticum* were recorded outside of the survey area on a windrow of an existing track, but the narrowing of the track footprint (2021 revision) will exclude any impact to this population. Any impact to conservation significant species if they were to occur within the survey area, would not significantly reduce their known populations.

The P1 species, *Tephrosia rosea var Port Hedland* (A.S. George 1114) is a perennial species and although the habitat indicates the species is likely to be present, it was not recorded during the survey. Therefore, clearing within this surveyed area is unlikely to have a significant impact on conservation significant flora.

Weeds (**Cenchrus ciliaris* and **C. setiger*) were recorded at very low densities (<2%) over the entire survey area. Care should be taken to prevent the spread of the highly invasive, single kapok (**Aerva javanica*) plant recorded in the survey area. This plant and its surrounding soil, should be removed, placed in a plastic bag, sealed and disposed of to prevent the spread of seeds throughout the area.

Prior to any clearing being undertaken, any young *Owenia reticulata* trees should be removed and transplanted around the Jinparinya Aboriginal Community to increase shade.

5.2 Fauna

Given the relatively small size of the survey area and the lack of habitat variety, the total fauna assemblage present is likely to be depauperate. The assemblage is also unlikely to be remarkable in any sense given that similar fauna habitats are extensive in the wider area. Given the nature of the fauna habitats present and the survey areas small size some fauna species, which would not typically reside in the survey area itself, in particular those that occur at low densities but have a large home range, may still occasionally be encountered.

During the survey period one vertebrate fauna species of conservation significance was positively identified as utilising the survey area, this being:

- Northern Quoll *Dasyurus hallucatus* – S2 (*BC Act*), Endangered (*EPBC Act*).

Several additional species of conservation significance may also utilise the survey area, though, as no evidence of their presence was identified during the field survey, their status in the area remains uncertain:

- Barn Swallow *Hirundo rustica* – S5 (*BC Act*), Migratory (*EPBC Act*)
- Peregrine Falcon *Falco peregrinus* – S7 (*BC Act*)
- Grey Falcon *Falco hypoleucos* – S3 (*BC Act*), Vulnerable (*EPBC Act*)
- Fork-tailed Swift *Apus pacificus* – S5 (*BC Act*), Migratory (*EPBC Act*)
- Bilby *Macrotis lagotis* – S3 (*BC Act*), Vulnerable (*EPBC Act*)
- Brush-tailed Mulgara *Dasycercus blythi*. - P4 (DBCA Priority Species)

Potential impacts on these fauna species and fauna in general will be nil to low due to the small area of clearing required and the large areas of adjoining and nearby similar and in some cases better quality

habitat. Nonetheless ongoing planning should consider the potential presence of fauna so that any impacts can be further minimised where considered reasonable and practicable.

Given the possible presence of some ground dwelling fauna species of conservation significance it is recommended that immediately prior to any clearing taking place, vegetation to be removed be inspected by a suitably licensed "fauna specialist" for the presence of fauna (in particular mulgara and bilby burrows) so that the appropriate management measures can be employed.

6 References

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Appendix A Conservation codes

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

CONSERVATION CODES

For Western Australian Flora and Fauna

Threatened, Extinct and Specially Protected fauna or flora[1] are species[2] which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

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

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

T **Threatened species**

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

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

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

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

CR **Critically endangered species**

Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

EN **Endangered species**

Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

VU **Vulnerable species**

Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Extinct species

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

EX Extinct species

Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

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

EW Extinct in the wild species

Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

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

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

MI Migratory species

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

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

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

CD Species of special conservation interest (conservation dependent fauna)

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

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

OS Other specially protected species

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

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

P Priority species

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

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

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

1 Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2 Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4 Priority 4: Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.
(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

[1] The definition of flora includes algae, fungi and lichens
[2]Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

Appendix B Vegetation classification and condition scales

Table B.1: Vegetation Classification System Specht (1970) as modified by Aplin (1979).

Stratum	70-100% cover	30-70% cover	10-30% cover	2-10% cover	<2% cover
Trees > 30 m	Tall closed forest	Tall open Forest	Tall woodland	Tall open woodland	Scattered tall trees
Trees 10-30 m	Closed forest	Open forest	Woodland	Open woodland	Scattered trees
Trees < 10 m	Low closed forest	Low open forest	Low woodland	Low open woodland	Scattered low trees
Shrubs > 2 m	Tall closed scrub	Tall open scrub	Tall shrubland	Tall open shrubland	Scattered tall shrubs
Shrubs 1-2 m	Closed heath	Open heath	Shrubland	Open shrubland	Scattered shrubs
Shrubs < 1 m	Low closed heath	Low open heath	Low shrubland	Low open shrubland	Scattered low shrubs
Hummock grasses	Closed hummock grassland	Hummock grassland	Open hummock grassland	Very open hummock grassland	Scattered hummock grasses
Grasses, sedges, herbs	Closed tussock grassland/ sedgeland/ herbland	Tussock grassland/ sedgeland/ herbland	Open tussock grassland/ sedgeland/ herbland	Very open tussock grassland/ sedgeland/ herbland	Scattered tussock grasses /sedges/herbs

Table B.2: Vegetation condition scale as adapted from Trudgen (1988) (EPA 2016a).

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

Appendix C Flora and fauna species recorded

Table C.1: Flora Species recorded during the Field Survey

Family	Species	Annual	Perennial	Conservation Code	Weed Species
Amaranthaceae	**Aerva javanica*		+		*
	Ptilotus astrolasius		+		
	Ptilotus calostachyus		+		
	Ptilotus polystachys	+			
Aizoaceae	*Trianthema pilosa*	+			
Apocynaceae	*Carissa lanceolata*		+		
Asteraceae	*Pluchea tetranthera*		+		
	Streptoglossa cylindriceps	+		Range extension	
Bignoniaceae	*Dolichandrone occidentalis*		+		
Boraginaceae	*Heliotropium muticum*		+		
	Trichodesma zeylanicum		+		
Chenopodiaceae	*Rhagodia eremaea*		+		
Convolvulaceae	*Bonamia alatisemina*		+		
	Bonamia linearis		+		
	Bonamia rosea		+		
	Distimake davenportii		+	Disjunct and Range extension	
	Evolvulus alsinoides	+			
Cucurbitaceae	*Cucumis maderaspatanus*	+			
Euphorbiaceae	*Euphorbia tannensis* subsp. *eremophila*	+			
Fabaceae	*Acacia colei*		+		
	Acacia ligulata		+	Northernmost end of its range	
	Acacia stellaticeps		+		
	Acacia tumida		+		
	Crotalaria ramosissima		+		
	Desmodium filiforme	+			
	Rhynchosia minima		+		
	Senna notabilis	+			
	Tephrosia rosea var *rosea*		+		
Goodeniaceae	*Dampiera candicans*		+	Not previously recorded in area	
	Goodenia microptera		+		
Gyrostemonaceae	*Codonocarpus cotinifolius*		+		
Lamiaceae	*Clerodendrum tomentosum var. lanceolatum*		+		

Family	Species	Annual	Perennial	Conservation Code	Weed Species
Lauraceae	*Cassytha capillaris*		+		
Malvaceae	*Corchorus incanus* subsp *incanus*		+		
	Gossypium australe		+		
	Seringia nephrosperma		+		
	Sida sp Pilbara (AA Mitchell PRP1543)		+		
	Triumfetta ramosa		+		
Meliaceae	*Owenia reticulata*		+		
Myrtaceae	*Corymbia flavescens*		+		
	Melaleuca lasiandra		+		
Poaceae	*Aristida sp.* 1 (medium) (dormant)		+		
	Aristida sp 2 (tall) (dormant)		+		
	**Cenchrus ciliaris*		+		*
	**Cenchrus setiger*		+		*
	Eriachne aristidea	+			
	Eragrostis eriopoda		+		
	Triodia epactia		+		
	Triodia schinzii		+		
Proteaceae	*Hakea lorea subsp. lorea*		+		
Sapindaceae	*Atalaya hemiglauca*		+		
Solanaceae	*Solanum phlomoides*		+		
Thynekaeaceae	*Pimelea ammocharis*		+		

Appendix D Naturemap and PMST database results

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Greg Harewood on 23/11/2020

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 118° 49' 54" E,20° 22' 07" S
Buffer 20km
Group By Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	237	1541
Priority 3	1	2
Priority 4	4	36
Protected under international agreement	34	431
Rare or likely to become extinct	10	918
TOTAL	**286**	**2928**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Rare or likely to become extinct					
1.	24784	*Calidris ferruginea (Curlew Sandpiper)*		T	
2.	24790	*Calidris tenuirostris (Great Knot)*		T	
3.	25575	*Charadrius leschenaultii (Greater Sand Plover)*		T	
4.	25576	*Charadrius mongolus (Lesser Sand Plover)*		T	
5.	24093	*Dasyurus hallucatus (Northern Quoll)*		T	
6.	24473	*Falco hypoleucos (Grey Falcon)*		T	
7.	24796	*Limosa lapponica subsp. menzbieri (Bar-tailed Godwit (northern Siberian))*		T	
8.	24180	*Macroderma gigas (Ghost Bat)*		T	
9.	25344	*Natator depressus (Flatback Turtle)*		T	
10.	24798	*Numenius madagascariensis (Eastern Curlew)*		T	
Protected under international agreement					
11.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
12.	25736	*Arenaria interpres (Ruddy Turnstone)*		IA	
13.	24779	*Calidris acuminata (Sharp-tailed Sandpiper)*		IA	
14.	24780	*Calidris alba (Sanderling)*		IA	
15.	25738	*Calidris canutus (Red Knot, knot)*		IA	
16.	24786	*Calidris melanotos (Pectoral Sandpiper)*		IA	
17.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
18.	24789	*Calidris subminuta (Long-toed Stint)*		IA	
19.	24378	*Charadrius veredus (Oriental Plover)*		IA	
20.	41332	*Chlidonias leucopterus (White-winged Black Tern, white-winged tern)*		IA	
21.	24478	*Fregata ariel (Lesser Frigatebird)*		IA	
22.	47954	*Gelochelidon nilotica (Gull-billed Tern)*		IA	
23.	24481	*Glareola maldivarum (Oriental Pratincole)*		IA	
24.	25630	*Hirundo rustica (Barn Swallow)*		IA	
25.	48587	*Hydroprogne caspia (Caspian Tern)*		IA	
26.	25739	*Limicola falcinellus (Broad-billed Sandpiper)*		IA	
27.	24795	*Limnodromus semipalmatus (Asian Dowitcher)*		IA	
28.	30932	*Limosa lapponica (Bar-tailed Godwit)*		IA	
29.	25741	*Limosa limosa (Black-tailed Godwit)*		IA	
30.	24799	*Numenius minutus (Little Curlew, Little Whimbrel)*		IA	
31.	25742	*Numenius phaeopus (Whimbrel)*		IA	
32.	48591	*Pandion cristatus (Osprey, Eastern Osprey)*		IA	
33.	24801	*Phalaropus lobatus (Red-necked Phalarope)*		IA	
34.	24802	*Philomachus pugnax (Ruff, reeve)*		IA	
35.	24843	*Plegadis falcinellus (Glossy Ibis)*		IA	
36.	24382	*Pluvialis fulva (Pacific Golden Plover)*		IA	
37.	24383	*Pluvialis squatarola (Grey Plover)*		IA	
38.	25642	*Sterna hirundo (Common Tern)*		IA	
39.	48593	*Sternula albifrons (Little Tern)*		IA	

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
40.	48597	*Thalasseus bergii (Crested Tern)*		IA	
41.	24806	*Tringa glareola (Wood Sandpiper)*		IA	
42.	24808	*Tringa nebularia (Common Greenshank, greenshank)*		IA	
43.	24809	*Tringa stagnatilis (Marsh Sandpiper, little greenshank)*		IA	
44.	41351	*Xenus cinereus (Terek Sandpiper)*		IA	
Priority 3					
45.	25024	*Ctenotus angusticeps (Airlie Island Ctenotus, Northwestern coastal Ctenotus)*		P3	
Priority 4					
46.	30903	*Dasycercus blythi (Brush-tailed Mulgara, Ampurta)*		P4	
47.	48395	*Dasycercus sp. (mulgara)*		P4	
48.	24233	*Pseudomys chapmani (Western Pebble-mound Mouse, Ngadji)*		P4	
49.	24803	*Tringa brevipes (Grey-tailed Tattler)*		P4	
Non-conservation taxon					
50.		*Acanthophis GT NOTHERN species*			Y
51.	25243	*Acanthophis pyrrhus (Desert Death Adder)*			
52.		*Acariformes sp.*			
53.	25536	*Accipiter fasciatus (Brown Goshawk)*			
54.	30833	*Amphibolurus longirostris (Long-nosed Dragon)*			
55.		*Aname ellenae*			
56.	24312	*Anas gracilis (Grey Teal)*			
57.	24316	*Anas superciliosa (Pacific Black Duck)*			
58.	47414	*Anhinga novaehollandiae (Australasian Darter)*			
59.	25318	*Antaresia perthensis (Pygmy Python)*			
60.	25670	*Anthus australis (Australian Pipit)*			
61.	24285	*Aquila audax (Wedge-tailed Eagle)*			
62.	25559	*Ardea intermedia (Intermediate Egret)*			
63.	41324	*Ardea modesta (great egret, white egret)*			
64.	24340	*Ardea novaehollandiae (White-faced Heron)*			
65.	24341	*Ardea pacifica (White-necked Heron)*			
66.	24610	*Ardeotis australis (Australian Bustard)*			
67.		*Areacandona 'iuno' (PSS)*			
68.		*Areacandona 'jessicae' (PSS)*			
69.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
70.	25567	*Artamus leucorynchus (White-breasted Woodswallow)*			
71.	24354	*Artamus leucorynchus subsp. leucopygialis (White-breasted Woodswallow)*			
72.		*Arthrorhabdus paucispinus*			
73.		*Australobolbus pseudobscurius*			
74.		*Blackburnium neocavicolle*			
75.		*Bolboleaus truncatus*			
76.	24251	*Bos taurus (European Cattle)*	Y		
77.	24359	*Burhinus grallarius (Bush Stone-curlew)*			
78.	47897	*Butorides striata (Striated Heron, Mangrove Heron)*			
79.	25715	*Cacatua roseicapilla (Galah)*			
80.	25716	*Cacatua sanguinea (Little Corella)*			
81.		*Carenum pulchrum*			
82.		*Carenum venustum*			
83.	25017	*Carlia triacantha (Desert Rainbow Skink)*			
84.		*Cavisternum clavatum*			
85.	25600	*Centropus phasianinus (Pheasant Coucal)*			
86.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
87.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
88.		*Chilibathynella sp.*			
89.		*Chlaenius australis*			
90.		*Chroicocephalus novaehollandiae*			
91.	24431	*Chrysococcyx basalis (Horsfield's Bronze Cuckoo)*			
92.	24288	*Circus approximans (Swamp Harrier)*			
93.	24289	*Circus assimilis (Spotted Harrier)*			
94.	24774	*Cladorhynchus leucocephalus (Banded Stilt)*			
95.	24399	*Columba livia (Domestic Pigeon)*	Y		
96.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
97.	25592	*Corvus coronoides (Australian Raven)*			
98.	25593	*Corvus orru (Torresian Crow)*			
99.	25701	*Coturnix ypsilophora (Brown Quail)*			
100.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
101.	25458	*Ctenophorus caudicinctus (Ring-tailed Dragon)*			
102.	24865	*Ctenophorus caudicinctus subsp. caudicinctus (Ring-tailed Dragon)*			
103.	25459	*Ctenophorus isolepis (Crested Dragon, Military Dragon)*			
104.	24876	*Ctenophorus isolepis subsp. isolepis (Crested Dragon, Military Dragon)*			
105.	24882	*Ctenophorus nuchalis (Central Netted Dragon)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
106.	25036	*Ctenotus duricola*			
107.	25462	*Ctenotus grandis*			
108.	25043	*Ctenotus grandis subsp. titan*			
109.	25045	*Ctenotus helenae*			
110.	25463	*Ctenotus pantherinus (Leopard Ctenotus)*			
111.	25064	*Ctenotus pantherinus subsp. ocellifer (Leopard Ctenotus)*			
112.	25073	*Ctenotus saxatilis (Rock Ctenotus)*			
113.	25077	*Ctenotus serventyi*			
114.	24322	*Cygnus atratus (Black Swan)*			
115.	24091	*Dasykaluta rosamondae (Little Red Kaluta)*			
116.	25000	*Delma haroldi*			
117.	25002	*Delma pax*			
118.	25004	*Delma tincta*			
119.		*Diacyclops cockingi*			
120.		*Diacyclops humphreysi humphreysi*			
121.		*Diacyclops scanloni*			
122.		*Diacyclops sobeprolatus*			
123.	24926	*Diplodactylus conspicillatus (Fat-tailed Gecko)*			
124.	24899	*Diporiphora valens (Southern Pilbara Tree Dragon)*			
125.	42402	*Diporiphora vescus (Northern Pilbara Tree Dragon)*			
126.	24470	*Dromaius novaehollandiae (Emu)*			
127.	25092	*Egernia depressa (Southern Pygmy Spiny-tailed Skink)*			
128.		*Egretta garzetta*			
129.		*Egretta novaehollandiae*			
130.		*Elanus axillaris*			
131.	25540	*Elanus caeruleus (Black-shouldered Kite)*			
132.	24290	*Elanus caeruleus subsp. axillaris (Australian Black-shouldered Kite)*			
133.		*Elaphoidella humphreysi*			
134.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
135.	24631	*Emblema pictum (Painted Finch)*			
136.		*Eolophus roseicapillus*			
137.	24653	*Eopsaltria pulverulenta (Mangrove Robin)*			
138.	25578	*Ephippiorhynchus asiaticus (Black-necked Stork)*			
139.	24568	*Epthianura aurifrons (Orange Chat)*			
140.	24570	*Epthianura tricolor (Crimson Chat)*			
141.	43381	*Eremiascincus pallidus (Western Narrow-banded Skink, Narrow-banded Sand Swimmer)*			
142.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
143.	47938	*Esacus magnirostris (Beach Stone-curlew, Beach Thick-knee)*			
144.		*Ethmostigmus curtipes*			
145.	24368	*Eurostopodus argus (Spotted Nightjar)*			
146.		*Euryscaphus waterhousei*			
147.	25621	*Falco berigora (Brown Falcon)*			
148.	24471	*Falco berigora subsp. berigora (Brown Falcon)*			
149.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
150.	24472	*Falco cenchroides subsp. cenchroides (Australian Kestrel, Nankeen Kestrel)*			
151.	25623	*Falco longipennis (Australian Hobby)*			
152.	24041	*Felis catus (Cat)*	Y		
153.	25727	*Fulica atra (Eurasian Coot)*			
154.	42314	*Gavicalis virescens (Singing Honeyeater)*			
155.	24956	*Gehyra pilbara*			
156.	24958	*Gehyra punctata*			
157.	24957	*Gehyra purpurascens*			
158.	24959	*Gehyra variegata*			
159.	24401	*Geopelia cuneata (Diamond Dove)*			
160.	24402	*Geopelia humeralis (Bar-shouldered Dove)*			
161.	25585	*Geopelia striata (Zebra Dove)*			
162.	24404	*Geophaps plumifera (Spinifex Pigeon)*			
163.	24276	*Gerygone tenebrosa (Dusky Gerygone)*			
164.	24443	*Grallina cyanoleuca (Magpie-lark)*			
165.	24484	*Grus rubicunda (Brolga)*			
166.	25627	*Haematopus fuliginosus (Sooty Oystercatcher)*			
167.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
168.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*			
169.	25541	*Haliastur indus (Brahminy Kite)*			
170.	24295	*Haliastur sphenurus (Whistling Kite)*			
171.		*Halicyclops (Rochacyclops) calm*			
172.	24961	*Heteronotia binoei (Bynoe's Gecko)*			
173.	24962	*Heteronotia spelea (Desert Cave Gecko, Pilbara Cave Gecko)*			
174.	47965	*Hieraaetus morphnoides (Little Eagle)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
175.	25734	*Himantopus himantopus (Black-winged Stilt)*			
176.	24491	*Hirundo neoxena (Welcome Swallow)*			
177.	24367	*Lalage tricolor (White-winged Triller)*			
178.		*Lampona ampeinna*			
179.		*Lamponina scutata*			
180.	25125	*Lerista bipes*			
181.	30928	*Lerista clara*			
182.	25005	*Lialis burtonis*			
183.	25661	*Lichmera indistincta (Brown Honeyeater)*			
184.	30933	*Lucasium stenodactylum*			
185.		*Lycidas sp. 1*			
186.	25489	*Macropus robustus (Euro, Biggada)*			
187.	24135	*Macropus robustus subsp. erubescens (Euro, Biggada)*			
188.	24136	*Macropus rufus (Red Kangaroo, Marlu)*			
189.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
190.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
191.	24583	*Manorina flavigula (Yellow-throated Miner)*			
192.		*Masasteron tealei*			
193.		*Melitidae sp.*			
194.	24736	*Melopsittacus undulatus (Budgerigar)*			
195.	25184	*Menetia greyii*			
196.	24598	*Merops ornatus (Rainbow Bee-eater)*			
197.		*Microcarbo melanoleucos*			
198.	25542	*Milvus migrans (Black Kite)*			
199.		*Minasteron minusculum*			
200.	25545	*Mirafra javanica (Horsfield's Bushlark, Singing Bushlark)*			
201.		*Monopylephorus n. sp. WA29 (ex Pristina WA3) (PSS)*			
202.	25495	*Morethia ruficauda*			
203.	25193	*Morethia ruficauda subsp. exquisita*			
204.		*Mormopterus (Ozimops) cobourgianus*			
205.		*Naididae (ex Tubificidae)*			
206.		*Nedsia nr hurlberti*			
207.		*Nedsia sp.*			
208.		*Nematoda sp.*			
209.	24969	*Nephrurus levis subsp. pilbarensis*			
210.		*No invertebrates*			
211.	25430	*Notaden nichollsi (Desert Spadefoot)*			
212.	24224	*Notomys alexis (Spinifex Hopping-mouse)*			
213.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
214.	24742	*Nymphicus hollandicus (Cockatiel)*			
215.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
216.		*Onthophagus margaretensis*			
217.	24618	*Oreoica gutturalis (Crested Bellbird)*			
218.		*Ostracoda (unident.)*			
219.	24620	*Pachycephala lanioides (White-breasted Whistler)*			
220.	25678	*Pachycephala melanura (Mangrove Golden Whistler)*			
221.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
222.		*Parastenocaris jane*			
223.	24627	*Pardalotus rubricatus (Red-browed Pardalote)*			
224.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
225.	48060	*Petrochelidon ariel (Fairy Martin)*			
226.	48061	*Petrochelidon nigricans (Tree Martin)*			
227.	24144	*Petrogale rothschildi (Rothschild's Rock-wallaby)*			
228.	25697	*Phalacrocorax carbo (Great Cormorant)*			
229.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
230.	25699	*Phalacrocorax varius (Pied Cormorant)*			
231.		*Phorticosomus gularis*			
232.		*Phreodrilid with dissimilar ventral chaetae*			
233.		*Phreodrilid with similar ventral chaetae*			
234.		*Pilbarascutigera incola*			
235.	24842	*Platalea regia (Royal Spoonbill)*			
236.	42306	*Platyplectrum spenceri (Centralian Burrowing Frog)*			
237.	25510	*Pogona minor (Dwarf Bearded Dragon)*			
238.	24908	*Pogona minor subsp. mitchelli (Dwarf Bearded Dragon)*			
239.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
240.	25706	*Pomatostomus temporalis (Grey-crowned Babbler)*			
241.	25199	*Proablepharus reginae*			
242.	24106	*Pseudantechinus woolleyae (Woolley's Pseudantechinus)*			
243.	24235	*Pseudomys desertor (Desert Mouse)*			
244.	24237	*Pseudomys hermannsburgensis (Sandy Inland Mouse)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
245.	25263	*Pseudonaja modesta (Ringed Brown Snake)*			
246.		*Ptilonorhynchus guttatus*			
247.	25724	*Ptilonorhynchus maculatus (Spotted Bowerbird)*			
248.	25009	*Pygopus nigriceps*			
249.		*Ramphotyphlops GT NOTHERN species*			Y
250.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
251.		*Rendahlia jaubertensis*			
252.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
253.	24457	*Rhipidura phasiana (Mangrove Grey Fantail)*			
254.		*Scolopendra laeta*			
255.		*Scolopendra morsitans*			
256.	24200	*Scotorepens greyii (Little Broad-nosed Bat)*			
257.	24120	*Sminthopsis youngsoni (Lesser Hairy-footed Dunnart)*			
258.	24482	*Stiltia isabella (Australian Pratincole)*			
259.	24927	*Strophurus elderi*			
260.		*Stygonitocrella trispinosa*			
261.	25307	*Suta punctata (Spotted Snake)*			
262.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
263.	24207	*Tachyglossus aculeatus (Short-beaked Echidna)*			
264.	30870	*Taeniopygia guttata (Zebra Finch)*			
265.	24175	*Taphozous georgianus (Common Sheath-tailed Bat)*			
266.		*Tesserodon novaehollandiae*			
267.		*Thalasseus bengalensis*			
268.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
269.	25202	*Tiliqua multifasciata (Central Blue-tongue)*			
270.	42351	*Todiramphus pyrrhopygius (Red-backed Kingfisher)*			
271.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
272.		*Trichocyclus gnalooma*			
273.	24851	*Turnix velox (Little Button-quail)*			
274.	24852	*Tyto alba subsp. delicatula (Barn Owl)*			
275.	25439	*Uperoleia glandulosa (Glandular Toadlet)*			
276.	25209	*Varanus acanthurus (Spiny-tailed Monitor)*			
277.	25210	*Varanus brevicauda (Short-tailed Pygmy Monitor)*			
278.	25212	*Varanus eremius (Pygmy Desert Monitor)*			
279.	25216	*Varanus giganteus (Perentie)*			
280.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
281.	25224	*Varanus pilbarensis (Pilbara Rock Monitor, Northern Pilbara Rock Goanna)*			
282.	24205	*Vespadelus finlaysoni (Finlayson's Cave Bat)*			
283.	24040	*Vulpes vulpes (Red Fox)*	Y		
284.		*Zebraplatys keyserlingi*			
285.	24857	*Zosterops luteus (Yellow White-eye)*			
286.	24248	*Zyzomys argurus (Common Rock-rat)*			

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.

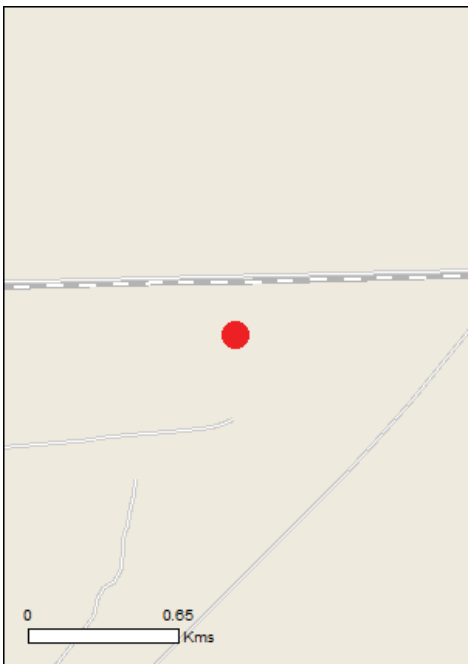
EPBC Act Protected Matters Report

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.

Report created: 23/11/20 14:02:55



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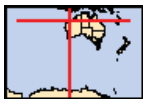

Summary

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:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	11
Listed Migratory Species:	14

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:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	20
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	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:	None
Regional Forest Agreements:	None
Invasive Species:	11
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
Rhinonicteris aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Liasis olivaceus barroni Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat may 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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundo rustica Barn Swallow [662]		Species or species habitat likely to 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 likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may 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
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may 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

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 may 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 habitat likely 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 may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may 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
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat may 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 likely to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat likely to 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 likely to occur

Name	Threatened	Type of Presence within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

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
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Mammals		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		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
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		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

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

-20.36874 118.83172

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 Agriculture Water and the Environment
GPO Box 858
Canberra City ACT 2601 Australia
+61 2 6274 1111